Brüel & Kjær

7007
Tape Recorder

Valid from serial no. 1110404

037-0439

Service

7007
Tape Recorder

Valid from serial no. 1110404

037–0439

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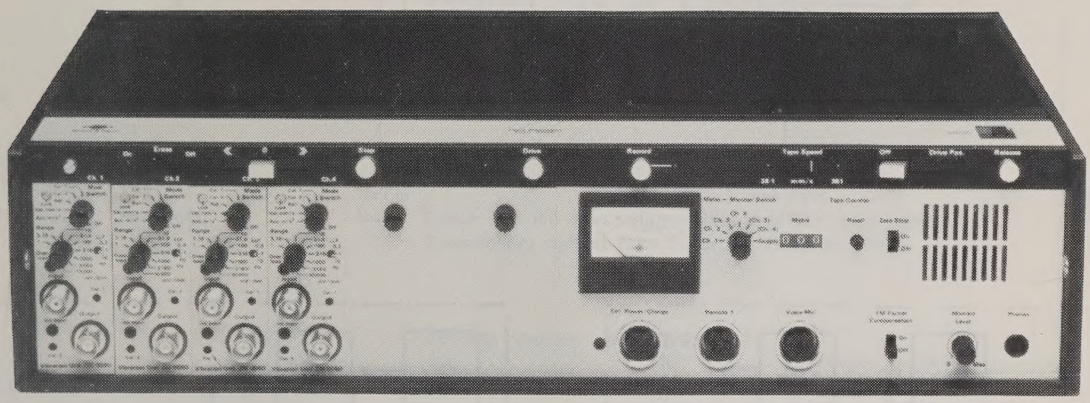


Attention

The opening of the apparatus is likely to expose live parts. Any adjustment, maintenance or repair of the opened apparatus under voltage shall be carried out only by a skilled person who is aware of the hazards involved.

Updating

Due to the constant progress in technology the instrument will from time to time be brought up to date in order to provide continuously improved performance.

For this reason there may be small variations between the instrument and the Service Instruction.

However, the local Service Representative is in possession of all informations regarding any change that has been made.

Spare Parts

Please state type and serial number of the instrument when ordering spare parts.

Trouble Shooting

If any fault should occur, check the instrument according to the Checking Procedure.

The Checking Procedure is divided up into sections, where each section will refer to a subsection in the Service Instruction corresponding to a specific part of the instrument.

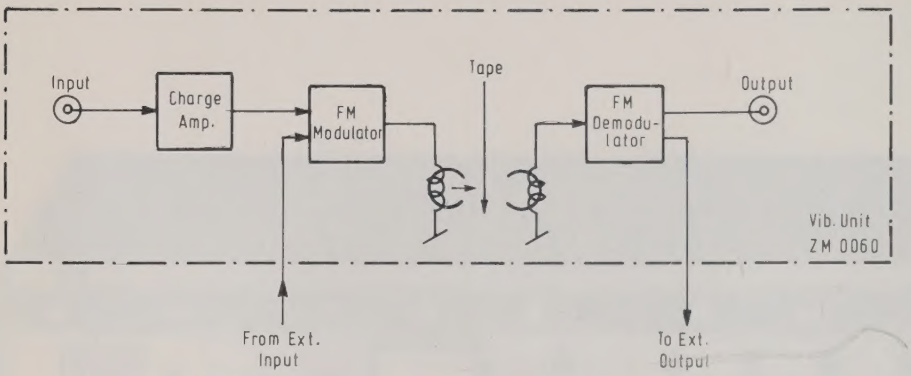
Before correcting any apparent deviation make sure that the measuring instrument has tolerances small enough not to affect the measurement.

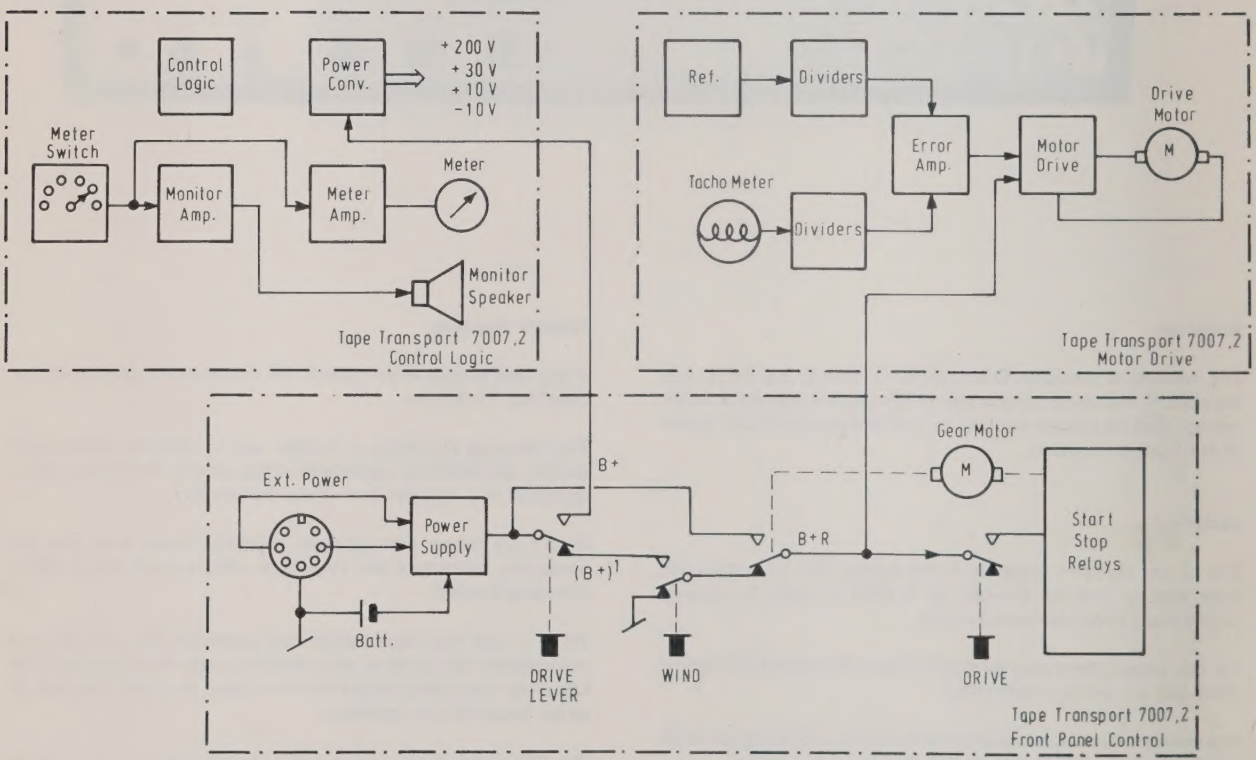
When a fault has been traced and corrected, the voltages and adjustments influenced by the correction must be rechecked. The complete instrument should then be tested to make sure that all basic functions are operative.

The tolerances given in these notes are intended for use as guide for adjustments.

Many instruments have various aids to be used when trouble shooting or adjustment is carried out. They are not necessarily mentioned in the Service Instruction.

The local Service Representative is in possession of information regarding these aids.


Input
Charge Amp.
FM Modulator
Tape
FM Demodu-lator
Output
Vib. Unit ZM 0060
From Ext. Input
To Ext. Output


Control Logic
Power Conv.
+200 V
+30 V
+10 V
-10 V
Meter Switch
Monitor Amp.
Meter Amp.
Meter
Monitor Speaker
Tape Transport 7007,2 Control Logic
Ref.
Dividers
Drive Motor
Error Amp.
Motor Drive
M
Tacho Meter
Dividers
Tape Transport 7007,2 Motor Drive
Gear Motor
M
Ext. Power
Power Supply
B+
(B+)1
B+R
Start Stop Relays
Batt.
DRIVE LEVER
WIND
DRIVE
Tape Transport 7007,2 Front Panel Control

Tape Winding

ZERO STOP: "On"

Load the Recorder with tape.
Reset the Meter Counter.
Wind 50 m tape and measure the time: 42 ± 5 s.

Rewind the 50 m.
Check that the tape stops at "000".
If necessary consult Tape Transport Electrical 7007.2.

Tape Drive

Activate "Drive".

Drive Lever to "Drive Pos."
TAPE SPEED: "38,1 mm/s"

Check that the tape runs and that the "38,1" LED lights.

TAPE SPEED to "381 mm/s"

Check that the tape runs and that the "381" LED lights.
If necessary consult Tape Transport Electrical 7007.2.

Record

Activate "Record" and "Drive".

Drive Lever to "Drive Pos."
ERASE: "On"

Check that the "Record" and the "Erase" LEDs light.

Auto Stop

ZERO STOP to "Off"

Rewind the tape and check that the Recorder stops when the reel is empty.
If necessary consult Tape Transport Electrical 7007.2.

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https://archive.org/details/manualsplus_09427

Calibration

Adjust "Cal 1" to minimum deflection on the built-in Meter.

MODE SWITCH: "Cal 1"
RANGE: "10000 mV/Unit
LLF: "0,3 Hz"
TAPE SPEED: 381 mm/s"
ERASE: "On"
ZERO STOP: "On"
FM FLUTTER COMP.: "Off"
METER MONITOR SWITCH to Ch. in question
Drive Lever to "Drive Pos."

MODE SWITCH to "Cal 2"

Adjust "Cal 2" to minimum deflection on the Meter.

MODE SWITCH to "Ref"

Turn the "Monitor Level" clockwise and check that the 1 kHz tone can be heard from the Monitor Speaker.

Check the Meter deflection 0,0 ± 0,2 dB.

Sensitivity

Input signal through a 1 nF capacitor (Adaptor type WB 0251):1000 mV, 1 kHz.

MODE SWITCH to "Acc"
RANGE to "1 mV/Unit"

Check the voltage on "Output": 1000 ± 10 mV.

Record 10 m tape.
Playback the recorded tape and check the voltage on "Output": 1000 ± 10 mV.

Frequency Response

Record 10 m tape with the 1 V signal where the frequency is varried between 2 Hz and 16 kHz.

Playback the recorded tape and check the voltage on "Output":

2 Hz to 1 kHz = 1000 ± 10 mV
16 kHz = 1000, −200 to-300 mV.

Signal to Noise Ratio

Record 10 m tape with the "Input" screened by means of the JP 0162 and YM 0420, following the intrument.
Playback the recorded tape and check the voltage on "Output":
max. 10 mV ~ −40 dB re 1 V.

TAPE SPEED to "38,1 mm/s"

Check again: Sensitivity
Frequency Response (0,3 to 1,6 kHz)
Signal to Noise Ratio: Max. 10 mV ~ −40 db re 1 V.

Record length approx. 1 m. Tolerances as before.

Distortion

Input signal: 1 V, 5 kHz.

TAPE SPEED to "381 mm/s"

Record 10 m tape.

Playback the recorded tape and check the 2 harmonic on "Output": Max. 1,5%. Bandwidth 316 Hz.

TAPE SPEED to "38,1 mm/s"

Input signal: "1 V, 500 Hz.

Check as above. (Bandwidth 31,6 Hz).

CHECKING PROCEDURE

Phase Control

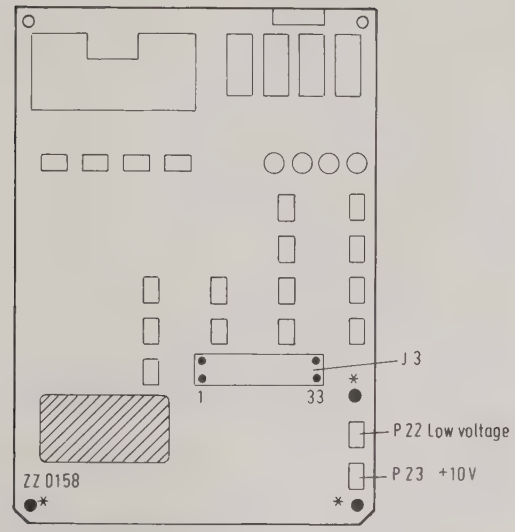
Input signal to Ch 2 and 4: 1 V, 10 kHz (Both Vibration Units).

TAPE SPEED to "381 mm/s"

Check by means of an oscilloscope the phase diffference between the signals on the two "Outputs".

Max. difference: $\pm 10\,\mu s$.

If necessary consult Tape Transport, Mechanical 7007.3 item 3–10.



Viewed from the component side.

Unscrew the three screws marked * and swing out the board.

Use Extension Cable (AR 0913) between P.C. Board and main chassis.

2.1 DC Voltages

Drive Lever to "Drive Pos."

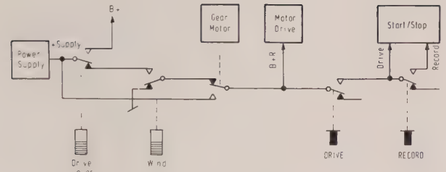
Check the following voltages:

ZZ 0158, J3 pin 11: + 10,01 ± 0,01 V.
If necessary adjust P23.

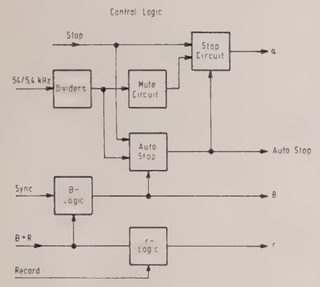
J3 pin 15: −10,4 ± 0,1 V
J3 pin 2: approx. + 30 V (loaded with a Preamp. on Comp. Preamp. "Input").

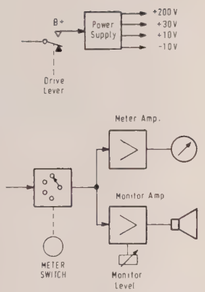
Check that the + 10 V at J3 pin 11 disappears when the battery voltage goes below 5,5 V.

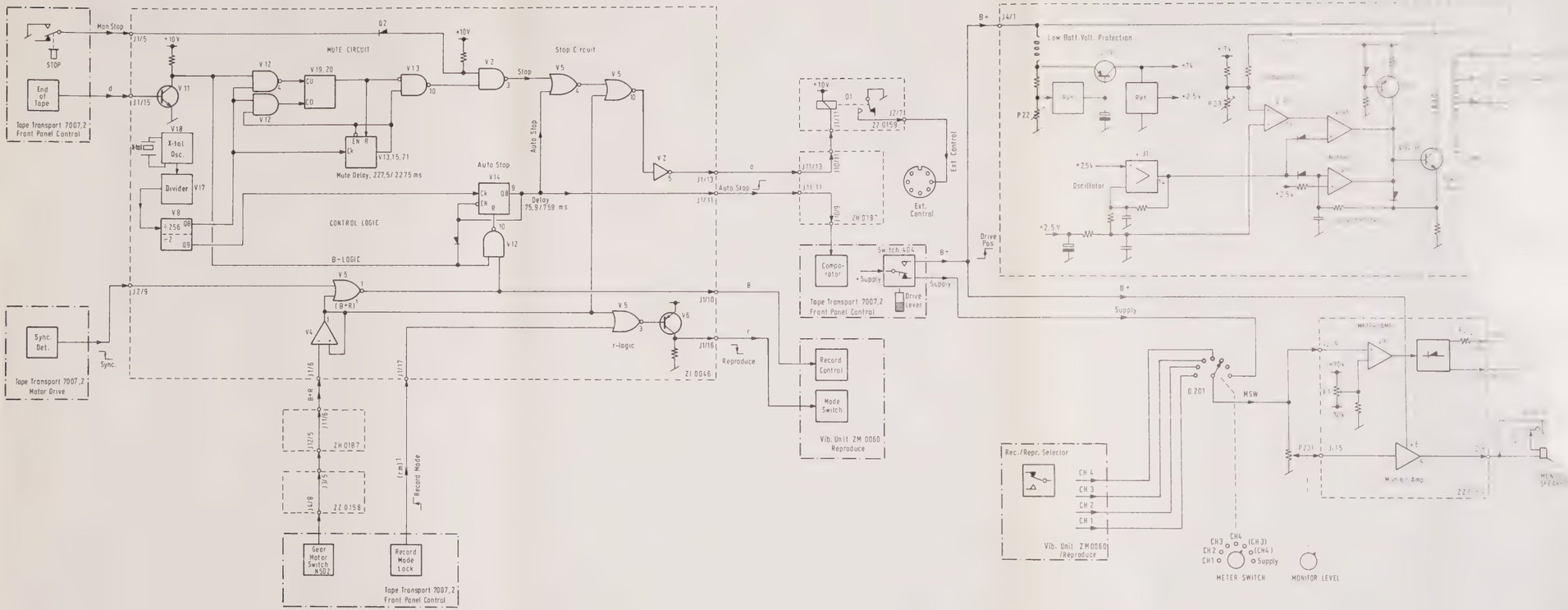
Check that the + 10 V comes back when the battery voltage increases above 7,2 V.
If necessary adjust P22.
(Simplified Diagram 2–7).

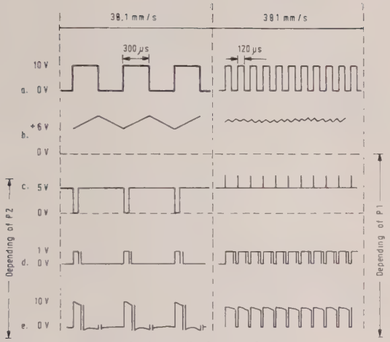

B+
+Supply
Power Supply
Gear Motor
Motor Drive
Start/Stop
B+R
Drive
Record
Drive Lever
Wind
DRIVE
RECORD

Control Logic

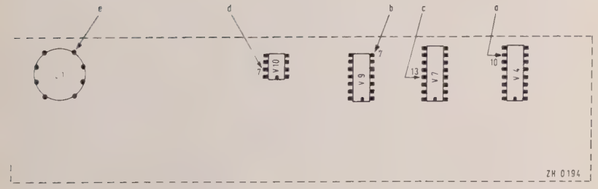


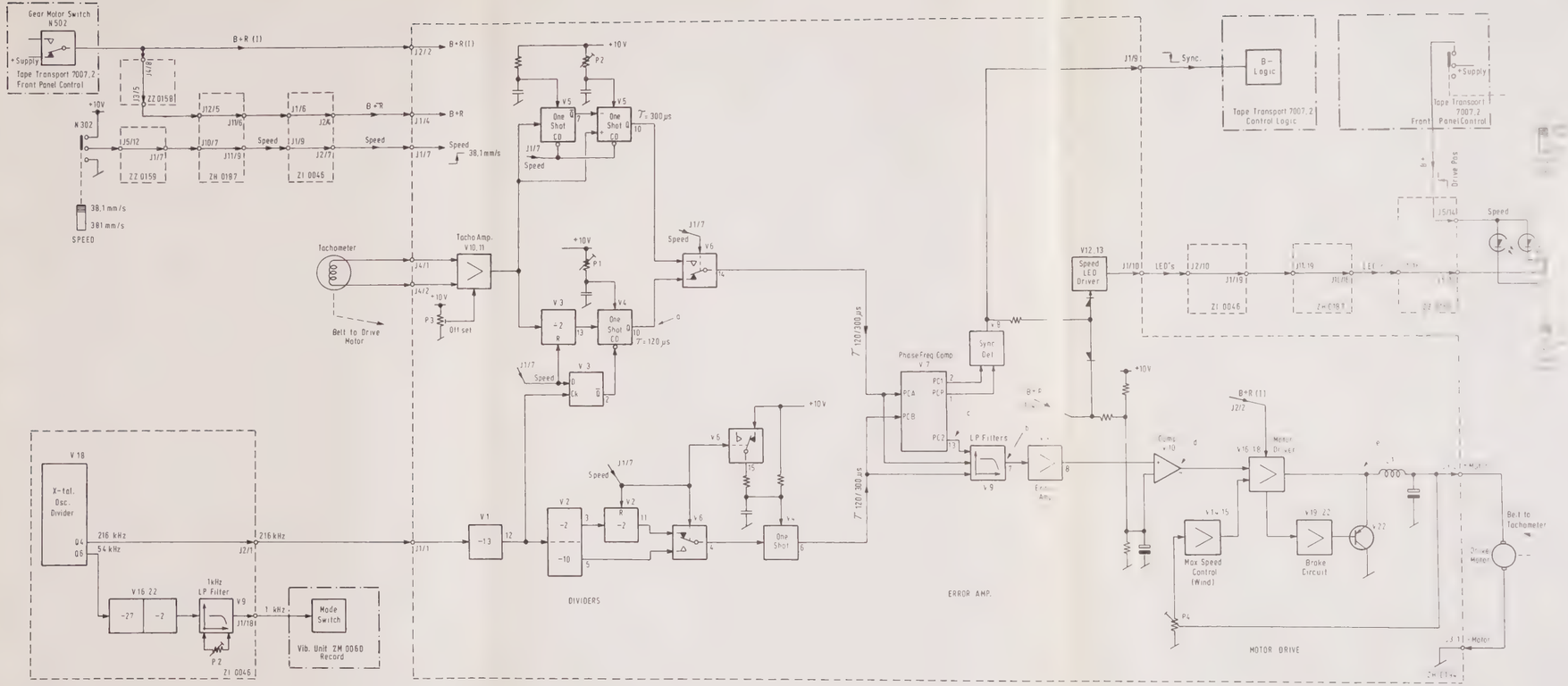




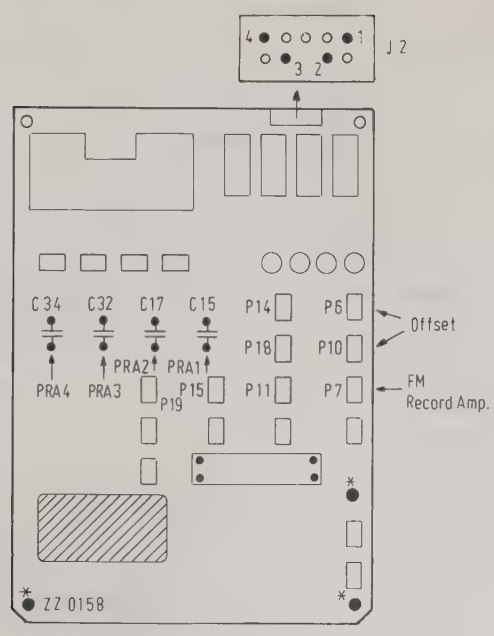


Pulse diagram of pulses on the Simplified Diagram.





Tape Transport 7007.2
Motor Drive



Viewed from the component side.

Unscrew the three screws marked * and swing out the board.

Use Extention Cable (AR 0913) between the P.C. Board and the main chassis.

2.1 Record Amplifier Offset

Measure the voltage at J2 pin 1 (ZZ 0158): 0 ± 10 mV.
If necessary adjust P6 (Ch. 1).

TAPE SPEED: "381 mm"
ERASE: "On"
METER-MONITOR SWITCH: "Ch. 1"
Drive Lever to "Drive Pos."

Repeat as above the the Ch. 2 to 4 using the J2 socket pin 2 to 4.
If necessary adjust the potentiometers P10, P14 and P18 respectively.
(Simplified Diagram 2–13).

Record Current Adjustment

Insert a Vibration Unit into Ch. 1.

Set MODE SWITCH to "Cal. 1" and "Cal. 2" respectively.
Check the built-in Meter reading: approx. -∞.

MODE SWITCH to "Acc."

Activate "Record" and "Drive".

Adjust P7 on ZZ 0158 for max. output at "PRA 1" (C15 on ZZ 0158).

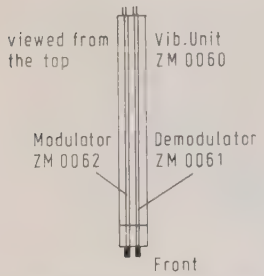
Input signal to "Input" 5 kHz adjusted to 0 dB at the built-in Meter.

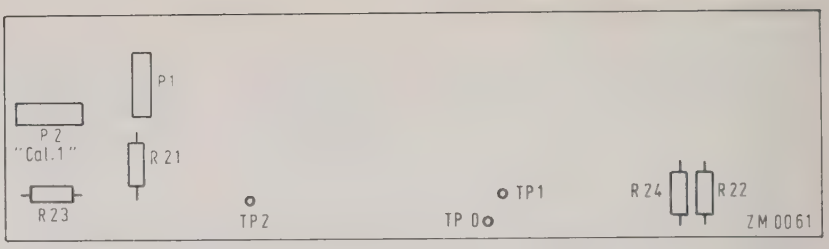
Check the 2nd harmonic on "Output": max. 1,5%.
If necessary readjust P7.

METER-MONITOR SWITCH to Ch. in question

Repeat as above for the Ch. 2 to 4 using the potentiometers P11, P15 and P19 respectively (C17, C32, C34 ~ PRA 2, 3, 4).
(Simplified Diagram 2–13).

ADJUSTMENT PROCEDURE





2.2 Demodulator ZM 0061 Adjustment

Insert the Vibration Unit in Ch. 2.
Use the Extension Board AR 0177.

MODE SWITCH: "Cal. 1"
RANGE: "1 mV/Unit"
METER-MONITOR SWITCH: "Ch. 2"
TAPE SPEED: "38.1 mm/s"
FM FLUTTER COMP.: "Off"
Drive Lever to "Drive Pos."

Check the voltage at TP1: 3570 ± 60 mV.
If necessary change the value of resistor R24 in proportion to the voltage.

TAPE SPEED to "381 mm/s"

Check as above.
If necessary change value of the resistor R22.

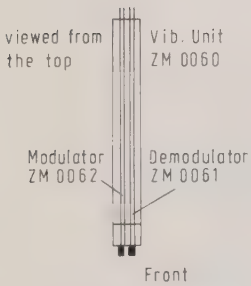
TAPE SPEED to "38,1 mm/s"

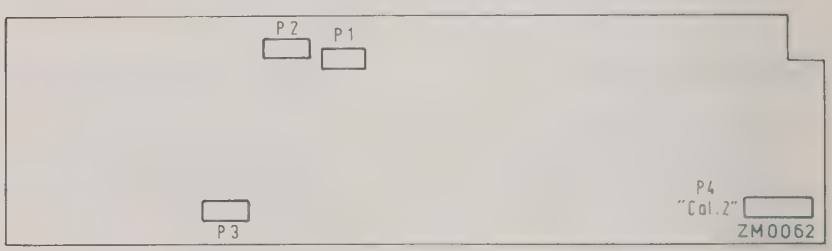
Check the built-in Meter reading: -∞.
If necessary adjust P2 "Cal. 1".

TAPE SPEED to "381 mm/s"

Check the built-in Meter reading: -∞.
If necessary adjust P1.

Repeat the adjustment of P1 and P2 as they influence each other.
(Simplified Diagram 2–15).





Modulator ZM 0062 Adjustment

FM FLUTTER COMP.: "On"
MODE SWITCH to "Acc."

Check the built-in Meter reading: -∞
If necessary adjust P2.

FM FLUTTER COMP. to "Off"
MODE SWITCH to "Cal. 2"

Check the built-in Meter reading: -∞
If necessary adjust P4.

MODE SWITCH to "Acc"

Input signal through a 1 nF capacitor (Adaptor type WB 0251) to "Input": 159 Hz, 1 000 mV.

Check the built-in Meter reading: 0,0 ± 0,1 dB.
If necessary adjust P1.

Check the voltage at "Output": 1 000 ± 15 mV.
If necessary adjust P3.

MODE SWITCH to "Vel."

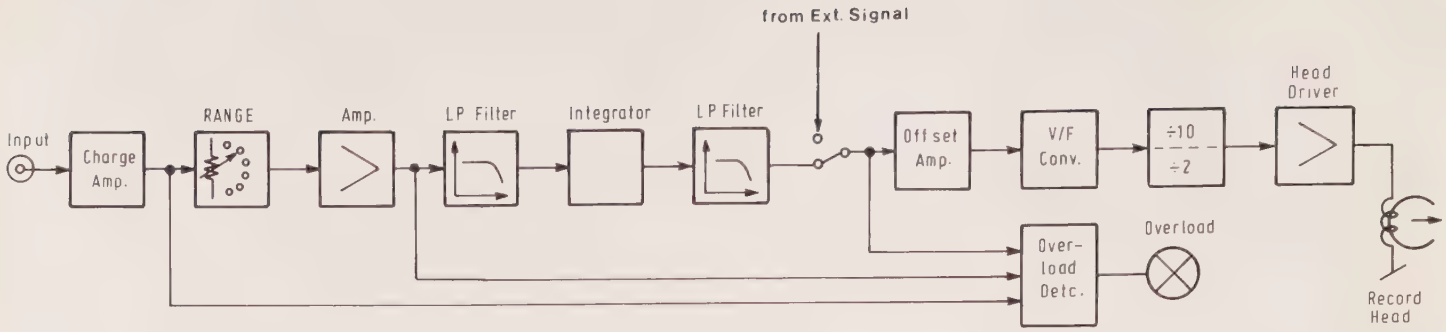
Check the built-in Meter reading 0,0 ± 0,1 dB.

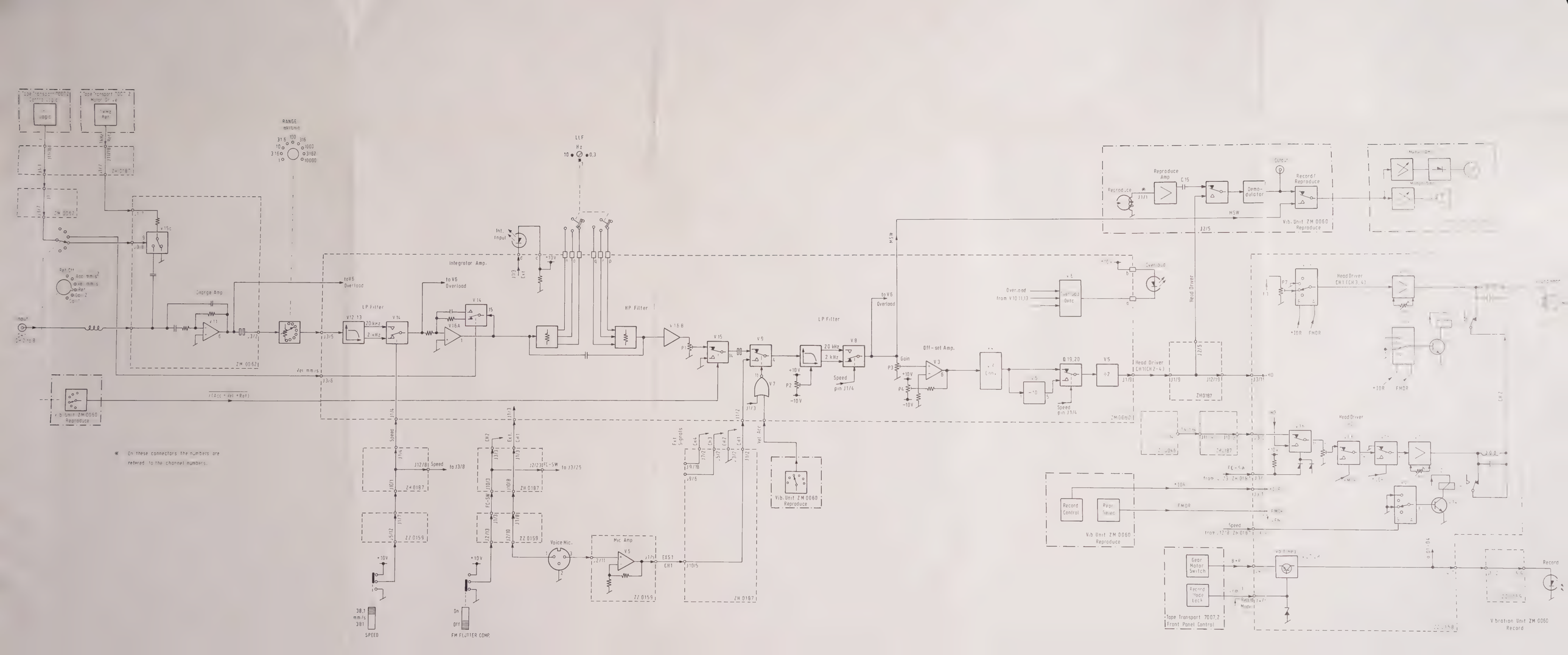
MODE SWITCH to "Ref."
RANGE to "10 000 mV/Unit"

Screen the "Input" socket.
Check the built-in Meter reading: 0,0 ± 0,2 dB.
(Simplified Diagram 2–13).

SIMPLIFIED DIAGRAM

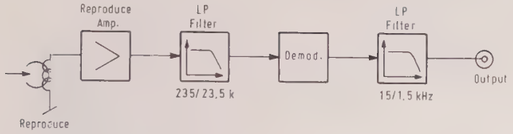
Record

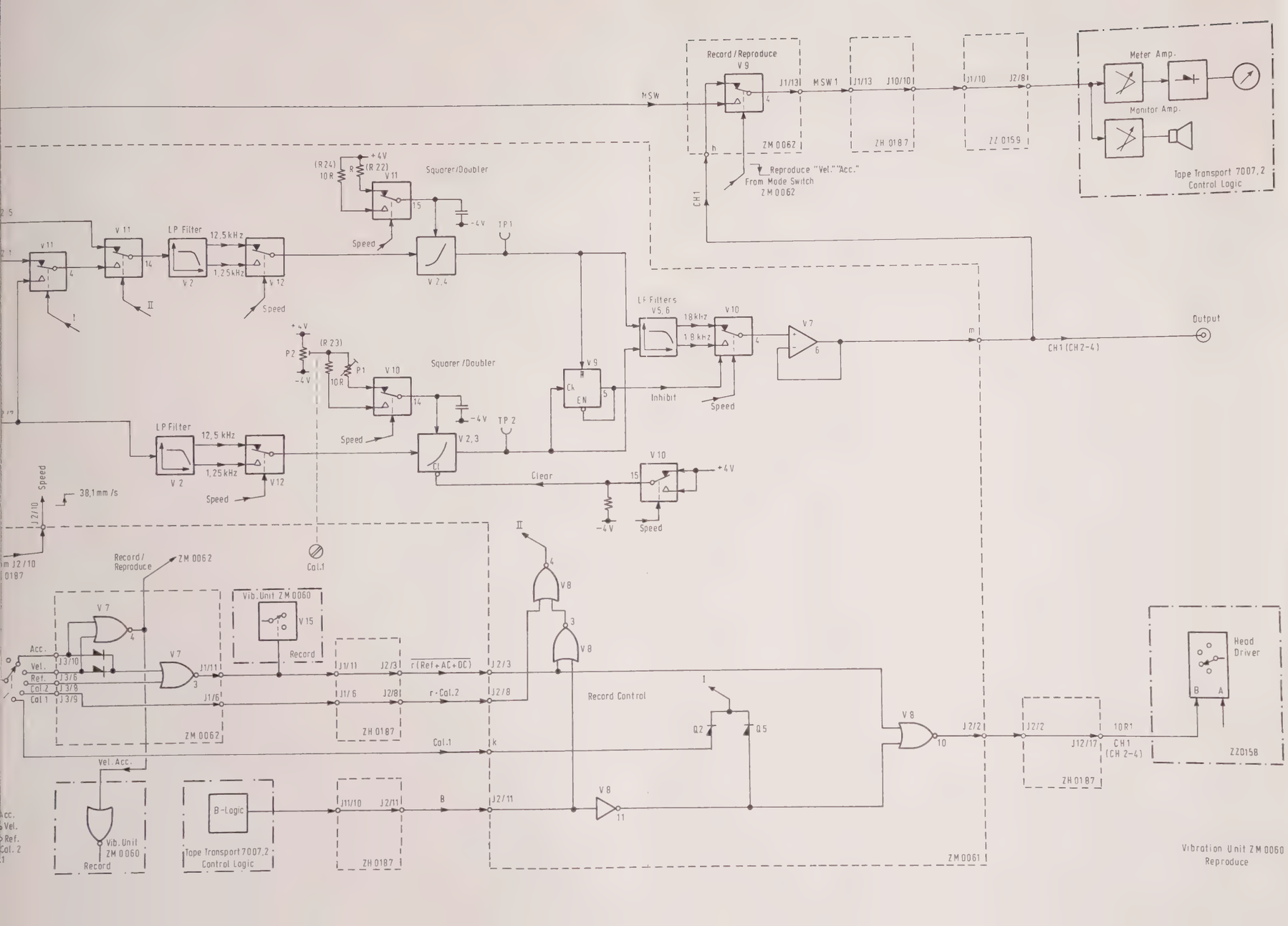


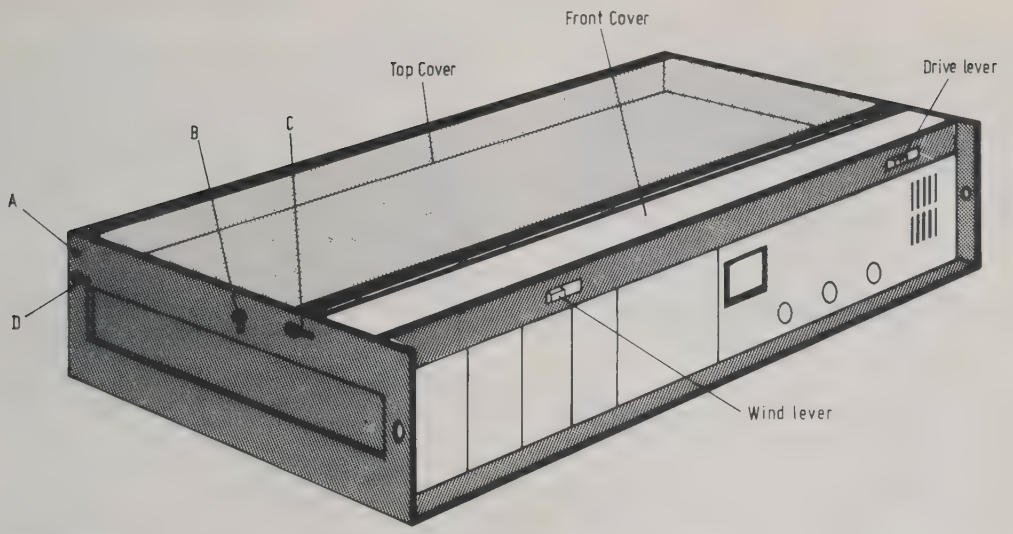

Tape Transport 7007.2 Motor Drive
Tape Transport 7007.2 Control Logic
Logic
RANGE mm/unit
LLF Hz
Int. Input
Integrator Amp.
Charge Amp
Ref Off
Acc mm/s²
Vel mm/s
Dist mm
Gain
Offset
LP Filter
HP Filter
20 kHz
2 kHz
Overload
Off-set Amp.
Speed pin J1/4
Head Driver CH1 (CH 3, 4)
Head Driver CH1 (CH 2-4)
Reproduce Amp
Record/ Reproduce
Demodulator
Vib. Unit ZM 0060 Reproduce
Vib. Unit ZM 0060 Record
Tape Transport 7007.2 Front Panel Control
Record Control
Repr. Select.
Gear Motor Switch
Record Lock
Voice Mic.
Mic Amp
Ext Signals
Ver Acc
Speed
FC-SW
FM FLUTTER COMP.
SPEED
ZM 0062
ZM 0187
ZZ 0159
ZH 0187
* On these connectors the numbers are refered to the channel numbers.

SIMPLIFIED DIAGRAM

Reproduce




Record / Reproduce
V 9
J1/13
MSW 1
J1/13
J10/10
J1/10
J2/8
Meter Amp.
Monitor Amp.
Tape Transport 7007,2
Control Logic
ZM 0062
ZH 0187
ZZ 0159
MSW
Reproduce "Vel." "Acc."
From Mode Switch
ZM 0062
CH1
+4V
(R24)
10R
(R 22)
V 11
Squarer/Doubler
15
-4V
TP1
Speed
V 2,4
V 11
LP Filter
12,5kHz
1,25kHz
V 2
V 12
Speed
LP Filters
V5, 6
18kHz
1,8 kHz
V 10
V 7
Output
CH1 (CH2-4)
Inhibit
Speed
(R 23)
P2
P1
10R
V 10
Squarer /Doubler
14
-4V
TP 2
V 2,3
V 9
Ck
EN
5
LP Filter
12,5 kHz
1,25 kHz
V 2
V 12
Speed
38,1 mm/s
J2/10
Speed
Clear
V 10
15
+4V
-4V
Speed
Record /
Reproduce
ZM 0062
Cal.1
II
V 8
4
3
V 8
Vib. Unit ZM 0060
V 15
Record
V 7
Acc.
Vel.
Ref.
Cal 2
Cal 1
J3/10
J3/6
J3/8
J3/9
J1/11
J1/6
ZM 0062
J1/11
J2/3
r(Ref+AC+DC)
J2/3
J1/6
J2/8
r·Cal.2
J2/8
ZH 0187
Record Control
I
Q2
Q5
V 8
10
J2/2
J2/2
10R1
J12/17
CH1
(CH 2-4)
ZH 0187
Head
Driver
B
A
ZZ0158
Cal.1
k
Vel. Acc.
Vib. Unit
ZM 0060
Record
B-Logic
Tape Transport 7007,2
Control Logic
J11/10
J2/11
B
J2/11
ZH 0187
V 8
11
ZM 0061
Vibration Unit ZM 0060
Reproduce



MAINTENANCE, Routine

The tape heads should be kept strictly clean at all times. Remove loose dust and oxide particles from the head area with a soft brush. Clean the surfaces of the heads with a soft lint-free cloth dampened with head cleaner.

Caution: Do not use excessive amounts of solvent. Use only enough to dampen the cloth.

The capstans, pressure rollers and the guide rollers should be cleaned whenever there is any indication of dirt or oxide particles deposited on the surfaces. Use the same procedure as mentioned under the cleaning of the tape heads.

The entire tape deck compartment should be kept free from loose particles. The top hinged cover can be cleaned with a soft cloth dampened in water to which a small amount of mild soap is added. Finish with a clean soft cloth dampened in water.

MAINTENANCE (Every six months, or if required)

Remove the rear cover and the battery pack. Unscrew bottom cover and swing out the main printed circuit board by loosening the three retaining screws.

Remove all loose dust particles from the tape transport with a soft brush. Clean both sides of the capstan drive belt with a soft cloth dampened with head cleaner solvent or Freon TF. Place the cloth on both sides of the belt and carefully pull the belt along its normal path until a complete passage has been made.

Do not oil or grease as this has been done from the factory.

Care should be taken not to cause the belt to move excessive sideways as this will cause the sides of the belt to become damaged. The direction of pull should be such as to cause the center drive pulley to rotate counterclockwise seen from the bottom of the recorder.

Clean the peripheral surfaces of all belt pulleys with head cleaner or Freon TF.

DISSAMBLY

The tape deck can be removed from the main frame as follows:

Remove the top cover by inserting a wire of max. 1 mm (0:40″) diameter through the holder "A". Push in the spring loaded pin and lift the cover free. Disengage the pin at the other end. Take care not to loose the washers located on either pin.

Turn the Drive lever to the "Drive" position in order to facilitate removal of the cover plate over the tape deck. Unscrew the two M2,5 × 6 screws "B", remove the two springs along each side plate. Slide the cover plate forward and lift up at the rear edge. Take care not to damage the smalll rolllers which protrude through the cover. Release the Drive lever.

Remove the front cover by unscrewing the two M3 × 12 screws "C" five full turns. Lift up the cover at the rear edge.
Remove the Wind lever and the Drive lever by unscrewing the two M3 × 10 hexagon screws using a 2,5 mm hexagon wrench.

Unplug the cable at the right side of the tape deck together with the screened cable plug. Remove the rear cover by unscrewing four M2 × 5 screws. Unplug the cables from the drive motor and the tachometer at the rear printed circuit board.

Remove the two M4 × 12 Supa Drive screws "D".
Loosen the two M3 × 8 hexagon screws holding the rear plate to the bottom profile five full turns using a 2 mm hexagon wrench.

Remove the three screws holding the tape head assembly and place the head assembly along the top profile holding it in place with adhesive tape. Remove the compander unit.

Remove the two M3 × 12 hexagon screws holding the tape deck towards the rear so the tape counter reset button is clear of the front plate. Lift up the tape deck taking care of the cables from the tape heads and from the drive motor and tachometer.

ASSEMBLY

Reverse the procedure for disassembly. Take care to position the tape counter button in the hole in the front plate without exerting to great a force upon the button. Position the cables from the drive motor and tachometer corrrectly with respect to the frame before lowering the tape deck into the frame.
Check that the cables from the tape heads are free of the capstan drive wheels.

Insert the rubber covered guide bushings into the holes in the tape deck (long bushing to either side, short bushing to the rear.) The height of the tape deck should be checked at both sides and at the rear. If an adjustment is necessary remove or add a spacer. When installing the front cover take care to place the washer and spacer out towards the head of the screws. Check that the sheet metal guide, along side of the Compander Unit, does not touch the Compander.

ADJUSTMENTS The adjustment procedure marked with A: Indicates that the adjustments can be carried out after removing the cover plate over the tape deck and the bottom plate.

B: Indicates that adjustments require the tape deck to be removed from the main frame. Refer to "Disassembly" for this procedure.

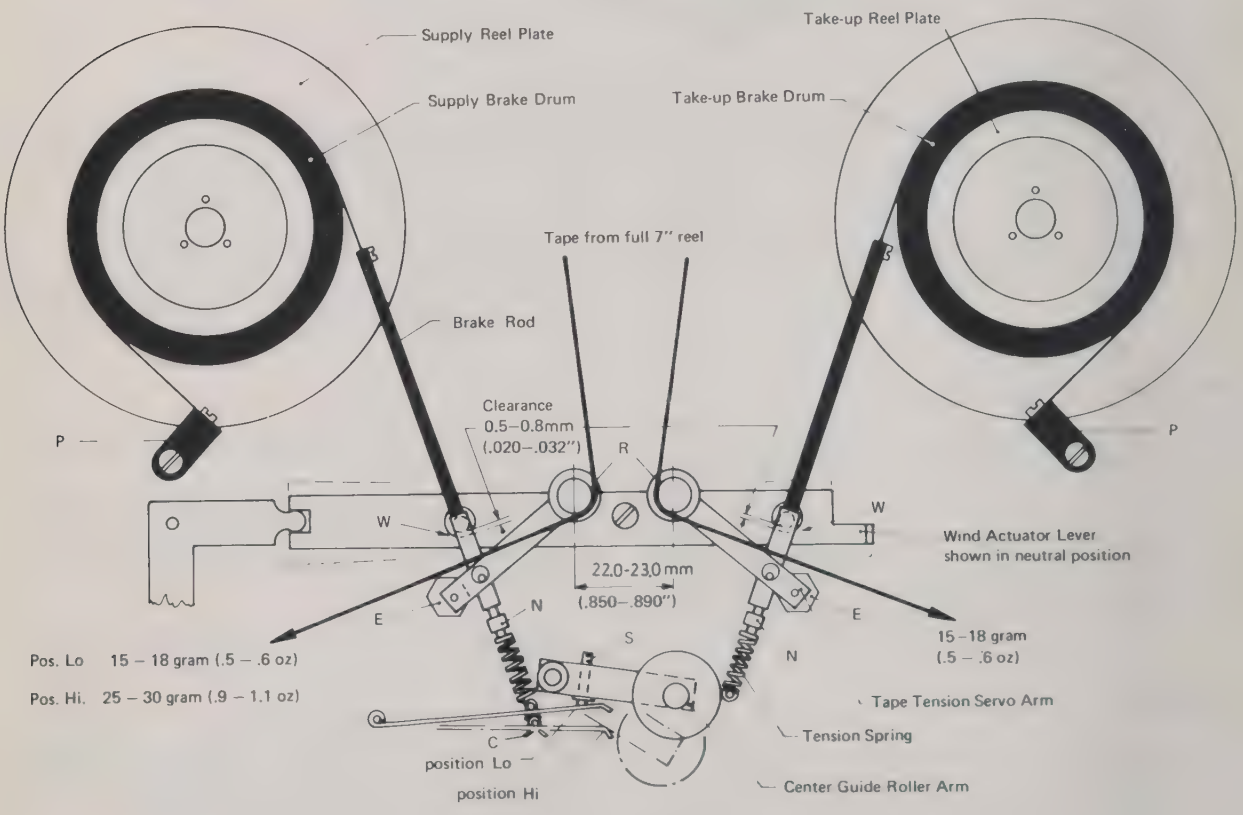


Fig.1

Top view

3.1 Tape Tension Rollers. A

On Fig. 1 the tape tension rollers are marked "R". With the Wind lever in neutral position and without tape on the recorder, the rollers should be straight across from each other with a distance between the centers of 22,0 - 23,0 mm (0,850–0,890").

If adjustment is necessary, first check that the clearance at point "W" (between the stud on the brake rod and the hole in the wind actuator lever) is 0,5–0,8 mm (0,020–0,032").

The clearance can be adjusted by the position of the brake band support "P".

If the brake band support "P" does not need an adjustment then the distance between the rollers can be adjusted at the excentric bearing "E".
The bearing is friction loaded and need not to be loosened. Turn the bearing to either side using an 8 mm = (5/16") flat wrench.

3.2 Supply Reel and Take-up Reel Brakes. A

Move Wind lever to either side and observe that the brake rod is moved 0,5–1 mm (0,02–0,40″) by the wind actuator lever.

There are two holdback tensions for the supply reel. These are governed by the position of the center guide roller arm.
Position Lo gives the holdback tension for fast forward winding and position Hi gives the holdback tension for drive operation.

Turn Drive lever to position "Drive" so center guide roller arm is in position Hi and place a full reel of tape on the supply reel spindle. Make a small loop on the end of the tape so a spring scale can be attached.
For a constant pull in the direction shown on Fig. 1 the scale should read 25–30 gr. (0,9–1,1 oz.).

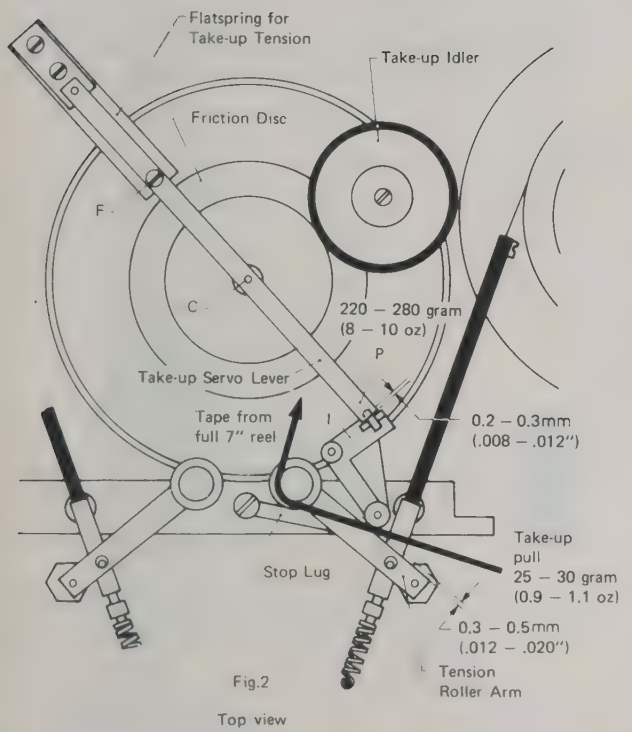


Fig.2
Top view

If an adjustment is necessary turn nut "N" in for a higher tension and out for a lower tension. As the nut is placed under the pinch roller arm the adjustment should be carried out by turning the spring at point "C". The scale reading will vary a bit dependent on how steady the pull is. An average should be judged from the high and low readings.

Release the Drive lever so the center guide rolller is in position Lo and check the tension as for position Hi. The scale should read 15–18 gr. (0,5–0,6 oz.).
If an adjustment is necessary loosen nut on adjustment screw "S" and turn the screw in for a higher tension and out for a lower tension. Thighten the nut again.

There is only one holdback tension for the take-up reel. This holdback functions under rewind operation. Turn the nut "N" until correct tension, 15–18 gr. (0,5–0,6 oz.), is obtained.

If the brake action is not sufficient clean brake drums and brake linings with freon.

3.3 Take-up Tension. A

The take-up tension is servo controlled by the same tension roller which controls the holdback tension under rewind operation. The tension roller arm acts against an intermediate arm "I" which again acts against the take-up servo lever. The servo lever regulates the torque delivered by the center drive by varying the pressure exerted on the friction disc. The torque is transmitted to the take-up spindle by the take-up idler wheel.

Check the clearance between the small roller on the arm "I" and the side of the tension roller arm. It should be 0,3–0,5 mm (0,012–0,020″). If necessary move the stop lug to obtain correct clearance.

Then check the clearance between the other small roller on "I" and the bevelled surface of the take-up servo lever. Here the clearance should be 0,2–0,3 mm (0,008–0,012″). Adjustment is carried out by the screw "C". Use a 0,9 mm (0,035″) hexagon wrench and lock the screw with lacquer or glue.

After the adjustment check the operation of the lever system by pushing the take-up tension roller towards the take-up reel. The take-up servo lever should be lifted high enough to relieve the pressure on the friction disc.

Check the tension on the take-up servo lever at the point marked "P": 220–280 gr. (8–10 oz.).

Place a full reel of tape on the take-up spindle. Thread the tape around the tension roller as shown on Fig. 2. Pull 0,5 m (1½ ft) of tape from the reel. Attach the spring scale and start the recorder. Slowly allow the tape to be wound up on the reel. The scale should read 25–30 gr. (0,9–1,1 oz.) otherwise adjust the screw "F". Use a 4 mm (4/32″) wrench for the adjustment nut and lock the screw and nut with lacquer or glue.

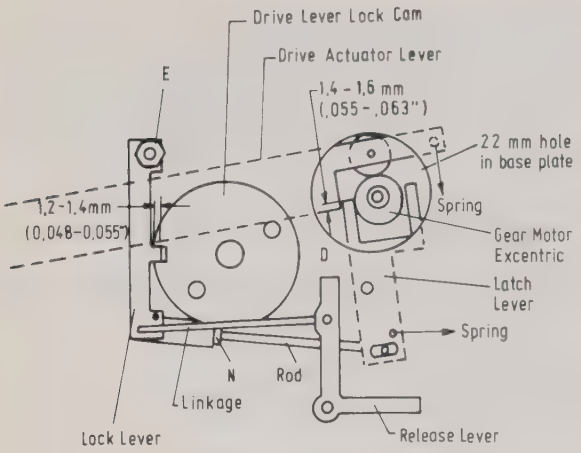


Fig. 3

3.4 Drive Function (Take-up Actuator). A

Upon initiation of DRIVE the gear motor will rotate one revolution courterclockwise and lift the drive actuator lever form position "Ready" to position "Drive" (see Fig. 4). It will be held in this position by the latch lever. This movement can also be done by hand, during adjustments, by merely pushing the drive actuator lever until the latch lever locks it in position. The latch lever is released by the RELEASE button and by the gear motor rotating one revolution clockwise when the STOP button is depressed.

For proper action of the latch lever the distance measured at D (see Fig. 3) should be 1,4–1,6 mm (0,055–0,063″). To obtain this distance adjust the excentric bushing at point E.

Fig. 3 shows the lock lever engaged in the drive lever lock cam. The amount of engagement should be 1,2–1,4 mm (0,047–0,055″). This can be adjusted by bending the linkage between the lock lever and the release lever.

For proper release action, the latch lever should release the drive actuator lever just before the lock lever releases the driver lever lock cam. If an adjustment is necessary, disconnect the rod at the latch lever by removing the retaining wings and loosen nut N. Lengthen or shorten rod for proper action.

The travel of the take-up actuator rod is nominal 1,5 mm (0,060″). This travel should move the take-up brake rod 0,7–1 mm (0,028–0,40″). Check that the clearance at point T (see Fig. 4) is 0,5–0,8 mm (0,020–0,032″). If not adjust small pad at screws D.

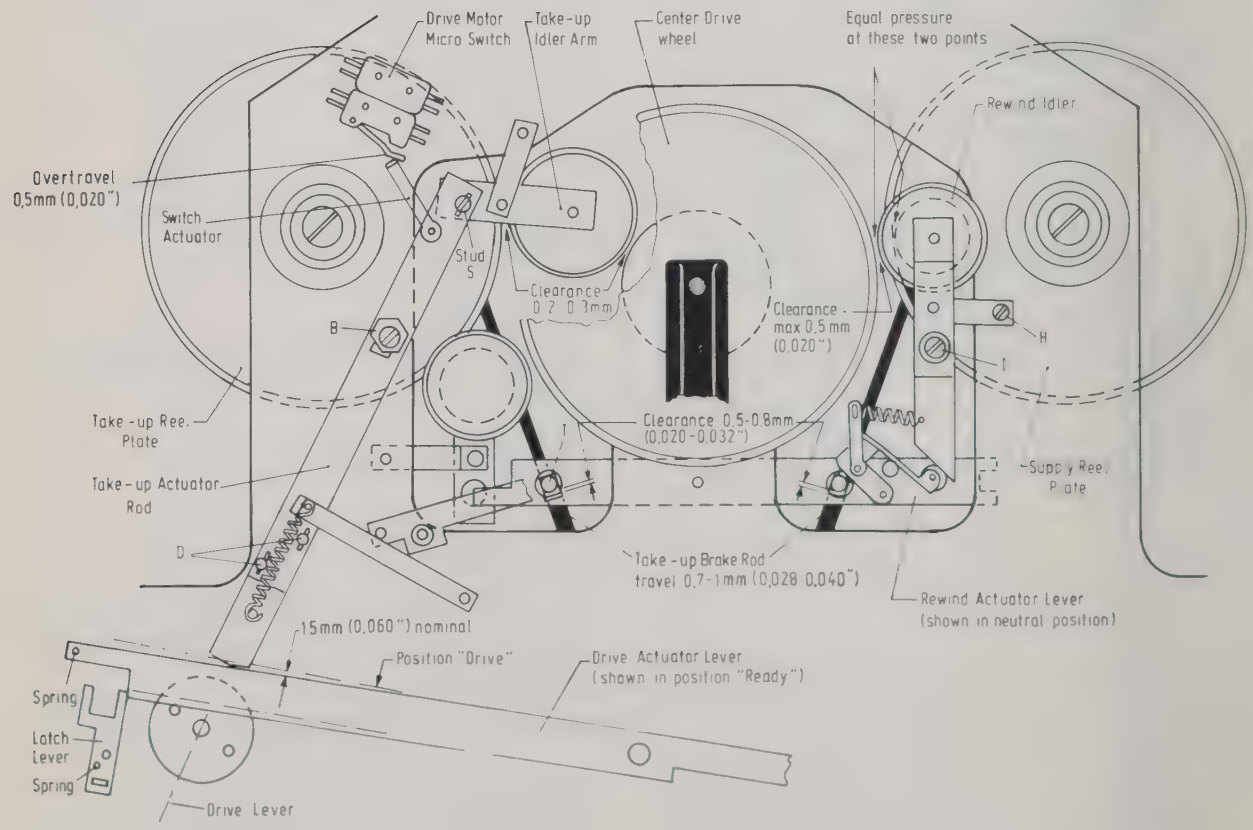


Fig. 4

3.5 Take-up and Rewind Idlers. A

The stud "S" (see Fig. 4) which controls the take-up idler arm should be adjusted to a position giving 0,3–0,5 mm (0,012–0,020″) clearance between the stud and the edge of the hole in idler arm. During adjustment the drive actuator lever should be in position "Drive". Use a 4 mm (5/32″) wrench for the bushing.

In position "Ready" check that the idler wheel is free from touching the rim of the take-up reel plate and the core of center drive Wheel. To obtain the proper clearance adjust the excentric bushing at point "B". Use an 8 mm (5/16″) wrench for the bushing.

For proper rewind function the rewind idler wheel should contact the inside of the supply reel plate and the rim of the center drive pulley with equal pressure.

Place the Wind lever in position "Rewind". Relieve the pressure on the idler wheel by pushing against the idler arm so the idler wheel just leaves the rim surfaces. Turn the center drive wheel slowly and allow the idler wheel to touch the rim. Observe that the idler wheel should make contact first with the Supply Reel and then with the Center Drive wheel. If an adjustment is necessary loosen the screw "H" and reposition the idler assembly.

With the Wind lever in neutral there should be 0,3–0,8 mm (0,012–0,032″) clearance between the idler wheel and the rim of the center drive. If an adjustment is necessary loosen the screw "I" and reposition the extension of the idler arm.

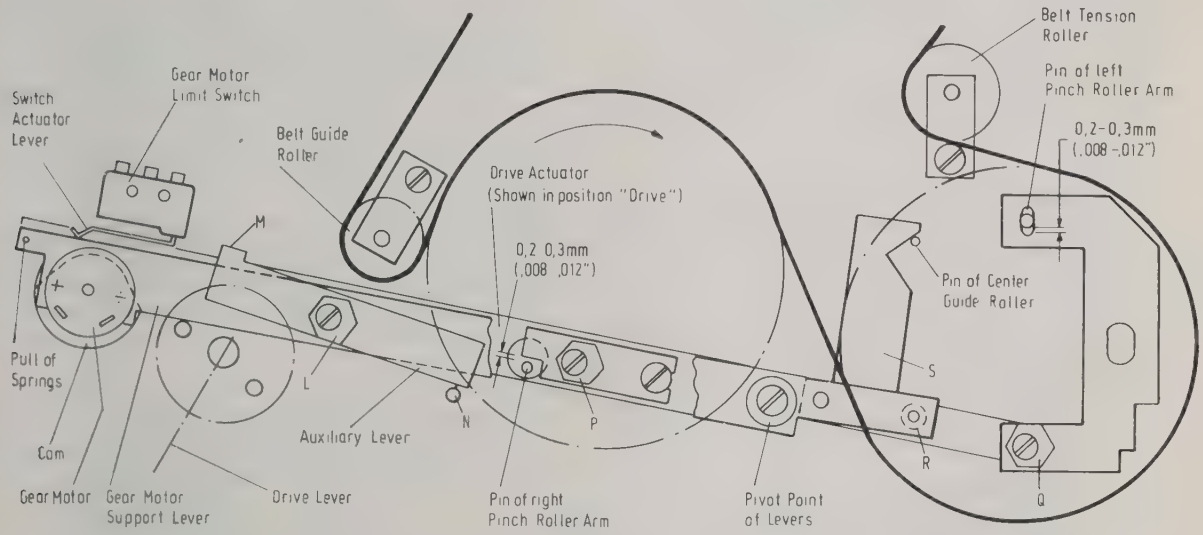


Fig. 5

3.6 Gear Motor Limit Switch. B

On Fig. 5 the switch is shown with the low part of the cam of the gear motor facing towards the switch. This is the normal stop position. In this position and with the Drive lever in position "Drive" the switch actuator lever should rest against the gear motor support lever.

Using a 1,5 mm (0,060″) hexagon wrench as a gauge move the switch actuator level 1,5 mm towards the switch. This should close the switch.

An audiable click can be heard when the switch is closed. Now slowly allow the switch actuator lever to move outwards from the switch . Again a click should be heard at a point 0,2–0,3 mm (0,008–0,012″) before the switch actuator lever rests against the gear motor support lever.

If an adjustment is necessary reposition the switch or carefully bend the switch actuator lever with a pair of flat nose pliers.

3.7 Pinch Roller Travel. B

The auxiliary lever located on the gear motor support lever must be so adjusted that it contacts the drive actuator lever at "M" and the pin "N" firmly when the Drive lever is in neutral position. An adjustment can be made at the excentric bushing "L". Use an 8 mm (5/16″) flat wrench for this adjustment.

With the auxiliary lever correctly adjusted both the drive actuator lever and the gear motor support lever will be held firmly against the two pins of the Drive lever shaft in neutral position by the two coil springs.

The drive actuator lever governs the travel of both the left and the right pinch roller. When moved to position "Ready" by the Drive lever there will be approx. 0,3 mm (0,012″) clearance between the pinch rollers and their respective capstan. When moved to position "Drive" through the action of the gear motor the pinch rollers will contact the capstans.

The pins of the pinch roller arms which protrude through holes in the base plate should in position "Drive" have 0,2–0,3 (0,008–0,12″) clearance to the levers acting against them. Adjustments can be carried out by the excentric bushings "P" and "Q". Use an 8 mm (5/16″) flat wrench for this adjustment.

3.8 Center Guide Roller Travel. B

Movement of the center guide roller to a position between the two magnetic heads is accomplished by the lever marked "S" on Fig. 5. When the gear motor support lever is moved by the Drive lever the lever "S" acts upon the pin from the center guide roller which protrudes through the base plate.

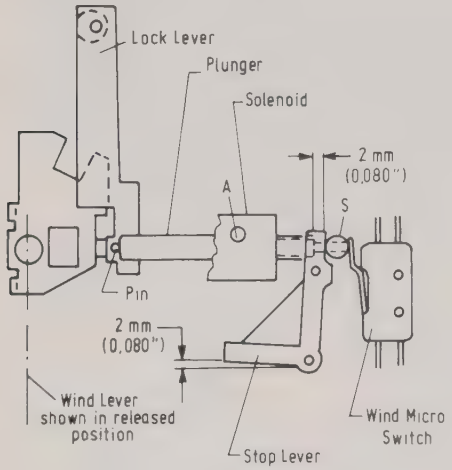


Fig 6

The guide roller should be held firmly in the advanced position. The pressure against the limit stop should be approx. 120gr. (4½ oz.). This can be measured using a spring scale with a string around the center guide roller.
If an adjustment is necessary turn the excentric bushing "R" using an 8mm (5/16") flat wrench.

3.9 Wind Stop Function. B

Stop of wind function is accomplished by either depressing the STOP button or by activating the stop solenoid. The solenoid plunger travels 2mm (0,080"). Stud "S" (see Fig. 6) limits the plunger's travel. It can be adjusted by loosening the hexagon set screw using a 0,91mm hexagon wrench.

The solenoid should be positioned so the stop lever is tilted 2mm (0,080") from perpendicular position. Loosen two screws marked A for this adjustment. Check that the pin at the end of the plunger can move the lock lever enough to release the wind lever. Bend the pin or reposition the solenoid if an adjustment is necessary. The wind micro switch, is positioned against stud "S", as shown in Fig. 6 so the contacts are closed plus an overtravel of approx. 0,2mm (0,080"). Check that the contacts open when the wind level is activated.

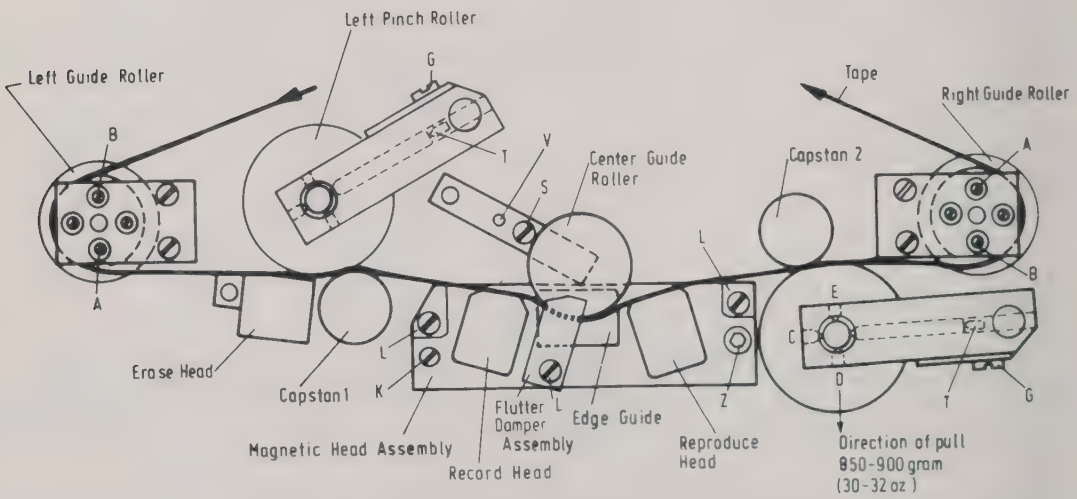


Fig. 7

3.10 Magnetic Head Assembly. A

The head assembly may be removed from the tape deck without loss of track height adjustment or azimuth adjustment. Disconnect the two cable plugs and unscrew the three retaining screws L.

When remounting the head assembly care should be taken that the mounting surfaces are strictly clean.
Adjustment of the reproduce head and check of the tape transport is carried out as follows:

Record a signal 10kHz, 1V on channel 1 and 4 simultaneously at a tape speed of 381mm/s.

Connect a dual beam oscilloscope to the outputs of channel 1 and 4 and check the phase difference between the two channels.

Average difference: 0 ± 5°
Max. difference: 30°

Before any adjustment, move the left or the right pinch roller away from the capstan. If this results in a better phase relationship check 3.12 Pinch Rollers.

In case that the phase difference is independent of the pinch rollers adjust screw "Z" slightly. The correct position of the screw should not depart more than ± 15° turn off the position set at the factory. If the phase difference cannot be obtained check 3.11 Guide Rollers.

Adjustment of Record Head screw K can only be done at the factory or at authorized service workshop.

3.11 Guide Rollers. A

The left and right guide rollers are furnished with a single edge guide. For correct tracking the tape should always be in close contact with the edge guide of the two rollers.
The height of the edge guide above the base plate is carefully set at the factory and should not be disturbed.

Run some tape in FAST FORWARD position and observe how the tape is guided by the guide rollers. A slight bulge on the edge of the tape should be seen where the tape leaves the roller. If the tape does not contact the edge guide, check that the tape is threaded correctly at the tape tension rollers.

If the tape is to be brought closer to the edge guide an adjustment of the tilt of the guide roller is necessary. Remove the plastic cover on top of the roller support: Loosen screw "A" 5–10° (see Fig. 7). Tighten screw "B" the same amount. It should not be attempted to turn the screws more than 20° from the original position. The two remaining screws should not be touched.

If the tape contacts the edge guide too heavily, which can be seen as a large bulge on the edge of the tape, the above adjustment procedure should be reserved.
The center guide roller is tilted slightly in order to keep the tape edge in constant contact with the fixed edge guide located between the two magnetic heads.

Loosen screw "V" using a 1,5 mm (0,080″) wrench. Turn screw "S" on the arm supporting the roller clockwise if the tape is to be brought in close contact with the guide. Tighten screw "V" again. This adjustment should only be made after having checked that the two pinch rollers are correctly adjusted, see 3.12 Pinch Rollers.

Whenever the guide rollers are adjusted check 3.10 Magnetic Head Assembly.

3.12 Pinch Rollers. A

The left and right pinch roller assemblies can readily for inspection or replacement. With Drive lever in neutral position loosen the screw "T" using a 2,5 mm (0,100″) hexagon wrench (Fig. 7) and pull the entire assembly upwards. When replacing the assembly make sure to engage the release pin , which protrudes through the base plate, with the hole in the release lever.

Place the Drive lever in position "Drive" and measure the pull required to move the pinch roller slightly. Attach a spring scale in the socket screw "E" and tighten the screw "T" in a position giving a tension of 850–900 gr. (30–32 oz.). Then move the pinch roller arms by hand to ascertain that they do not bind.

To align the pinch roller parallel to the capstan, loosen the erase head and place a suitable light source at the capstan and observe the narrow beam of light. Press the roller towards the capstan to make the light beam more narrow. If there is an unequal amount of light along the line of contact, adjust either screw "D" or "E" using a 1,27 mm (0,050″) hexagon wrench.

Run some tape on the recorder at a speed of 381 mm/s. Move the pinch roller momentarily away from the capstan by hand. Observe if the tape moves sideways where it leaves the capstan with the pinch roller engaged or disengaged. If the tape moves more than 0,2 mm (0,008″) upwards turn the screw "G" 20° out and turn the screw "C" an equal amout in. Repeat the adjustment if necessary. However, do not exceed more than 60° turn of the screws from their original position. If the tape still moves sideways it might be caused by a defective roller (curved surface) and a replacement of the roller is necessary.

After adjustment of the pinch roller fasten the erase head with a distance of 0,3–0,5 mm (0,012–0,020″) from the left roller when the roller is held against the capstan.

Whenever adjustment of the pinch rollers is carried out check 3.10 Magnetic Head Assembly.

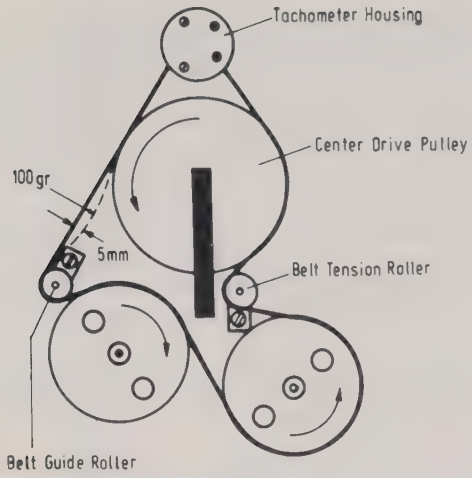


Fig 8

3.13 Capstan Belt Drive. A

If it should become necessary to remove the capstan drive belt proceed in the following manner:

Loosen the belt tension roller to make the belt slack.

Remove the cover of the tachometer by unscrewing the four retaining screws. Note how the signal leads from the tachometer coil leaves the housing.

Remove the belt from the capstan pulleys and slide the belt carefully out of the tachometer housing along the inside edge while making a large loop in order to pass the toothed disc.

The belt tension can be adjusted at the belt tension roller. With 100 gr. (3½ oz.) pressure against the belt applied midways between the belt guide roller and the center drive pulley, the belt should deflect 5 mm (0,200″). See Fig. 8.

The correct guiding of the belt upon the three large pulley is mainly done by the small belt guide roller which has a crowned surface. Tilting the arm away from the base plate will couse the belt ot move closer to the base plate. It is important that the belt is rotated in the correct direction while making this adjustment. Do not attempt to tilt the arm holding the belt tension roller.

The correct belt position can be seen on the center pulley. The edge of the belt should be 0,3–0,8 mm (0,012–0,032″) inside the edge of the pulley facing away from the base plate.

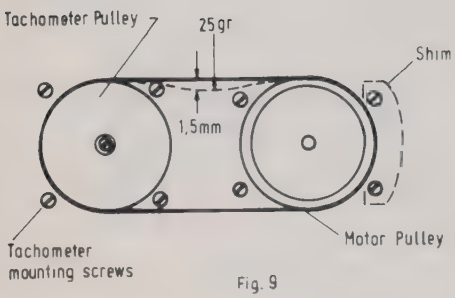


Fig. 9

3.14 Motor Drive Belt. A

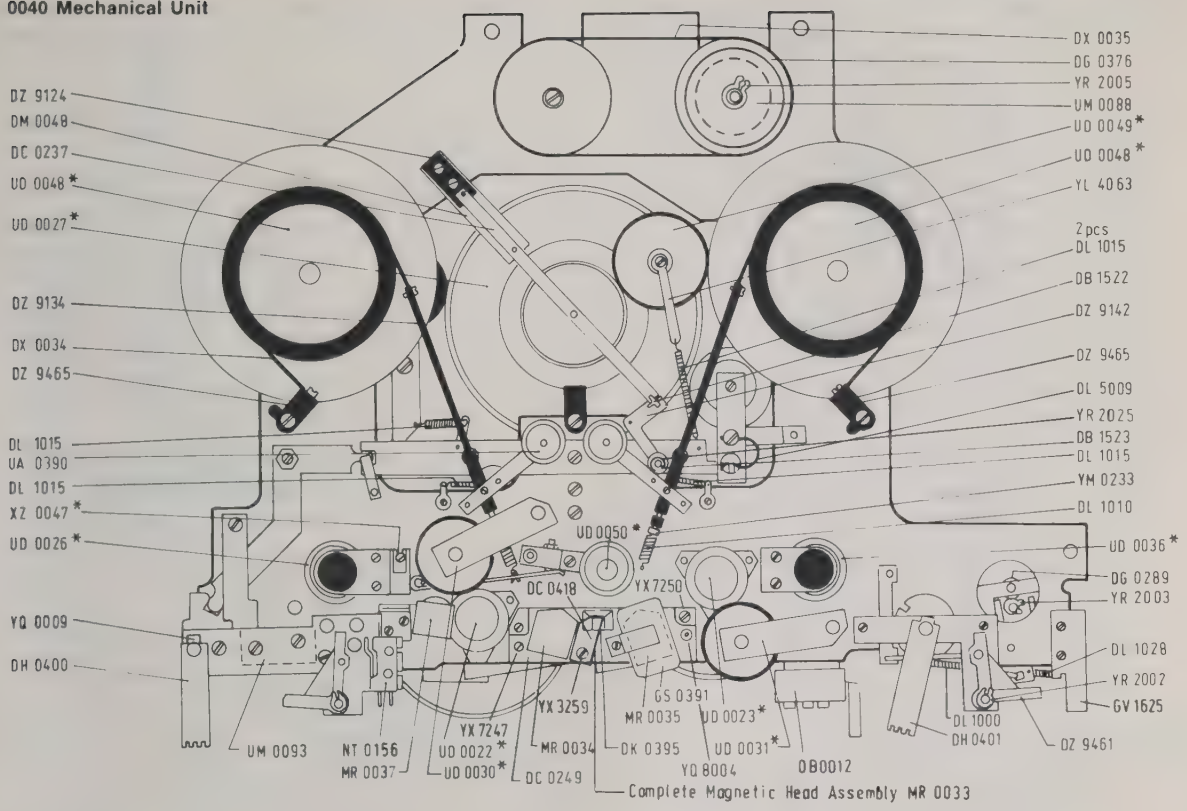
The belt can be removed by carefully guiding the belt off the edge of the pulleys while slowly rotating these. Note how the belt is orientated with respect to the base plate. Turning the belt upside down might cause the belt to travel incorrectly on the pulleys when it again is placed on the pulleys.

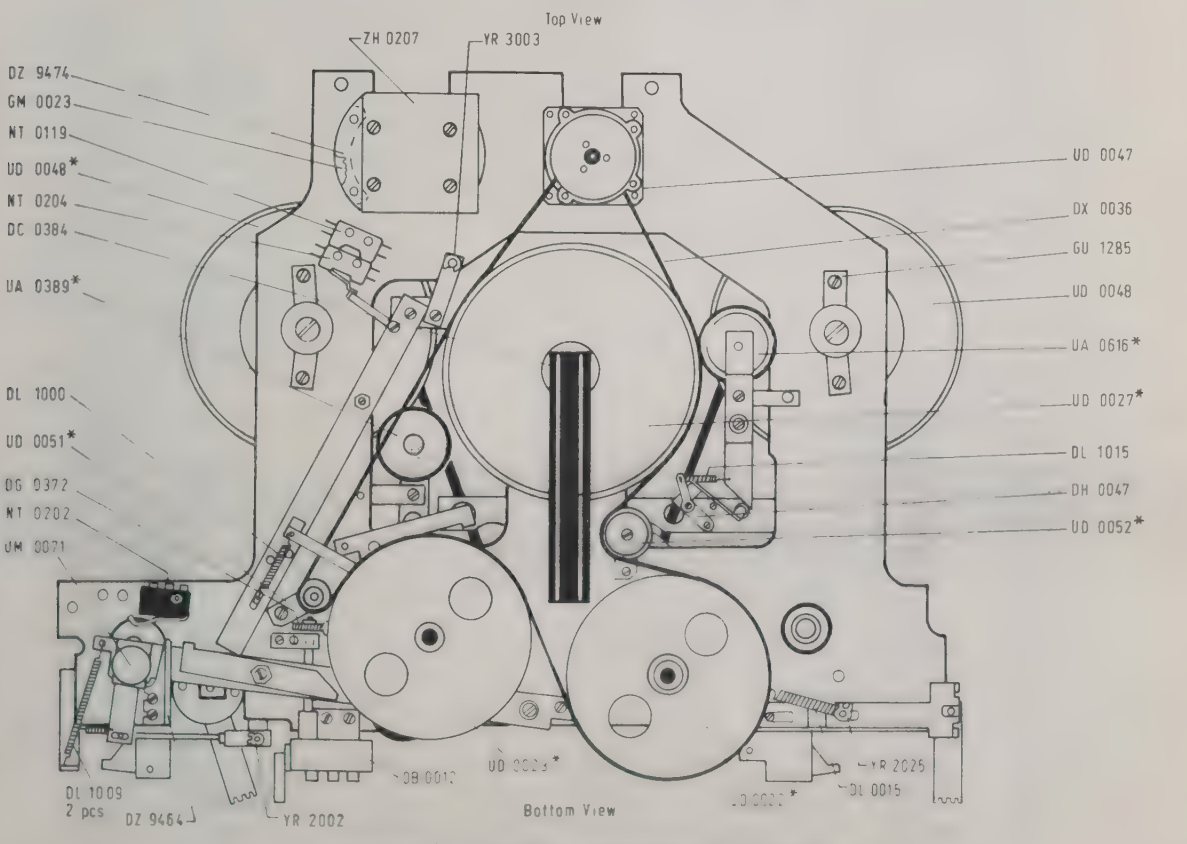
The correct belt tension can be measured as illustrated on Fig. 9. With 25 gr. (0,9 oz.) pressure agianst the belt applied midways between the two pulleys, the belt should deflect 1,5 mm (0,060″). The belt tension can be adjusted by loosening the four screws holding the tachometer housing and moving the housing to obtain correct tension. The motor housing can be moved also if necessary.

The guiding of the belt is accomplished by both pulleys as they both have a crowned surface.

If a new belt is to be installed it may be necessary to try turning the belt upside down in order to keep the belt running correctly on the pulleys. If necessary add or remove a shim located between the motor housing and the base plate at the side away from the tachometer.

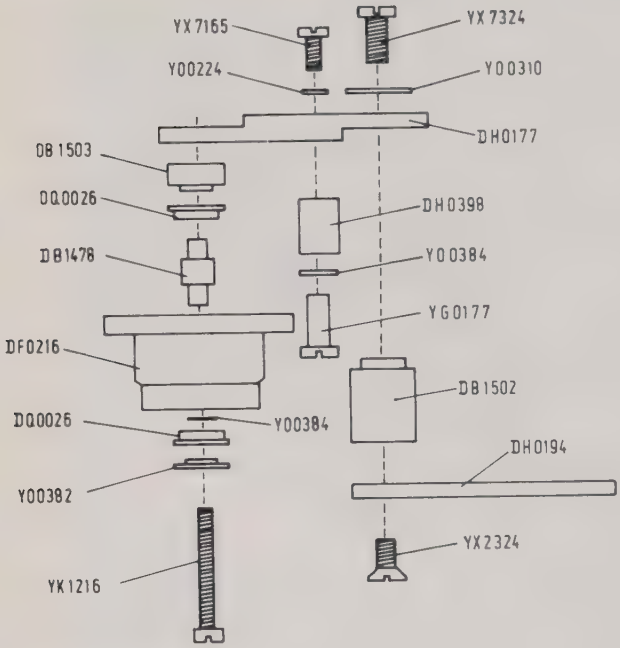
UD 0040 Mechanical Unit



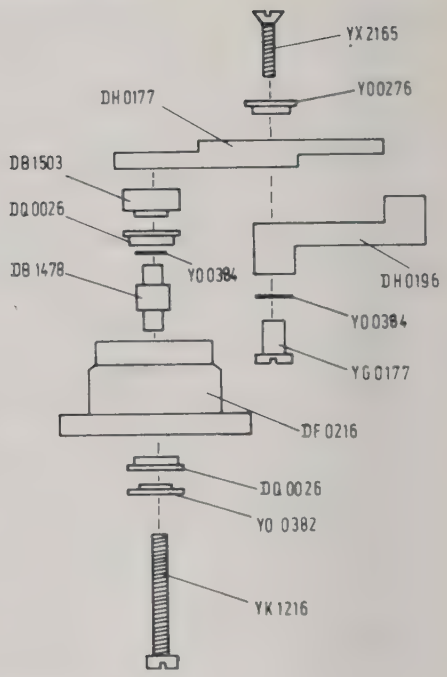


Parts marked * are complete units. Detailed drawings on the following pages.

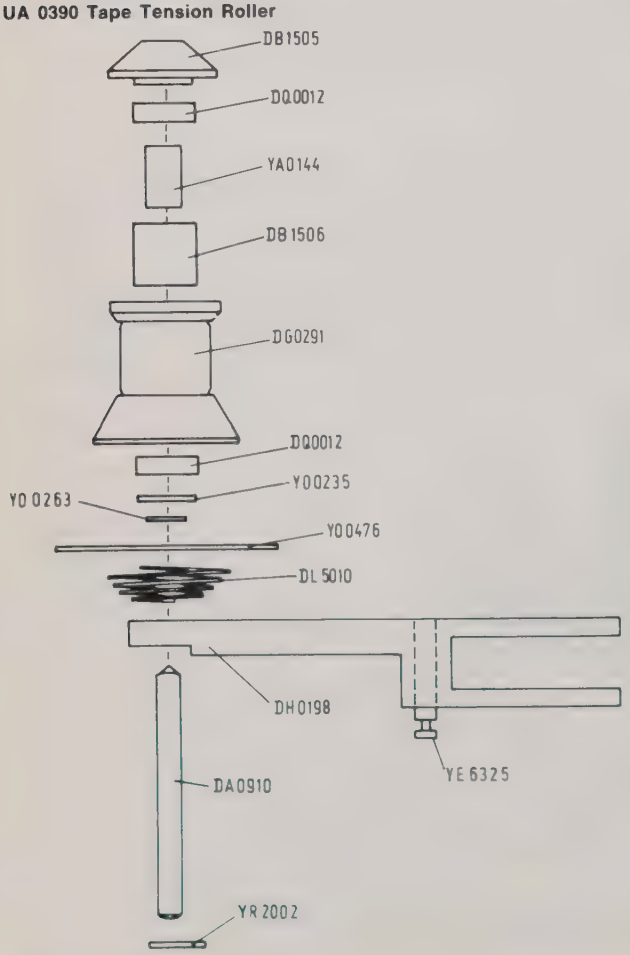
UA 0601 Rewind Idler



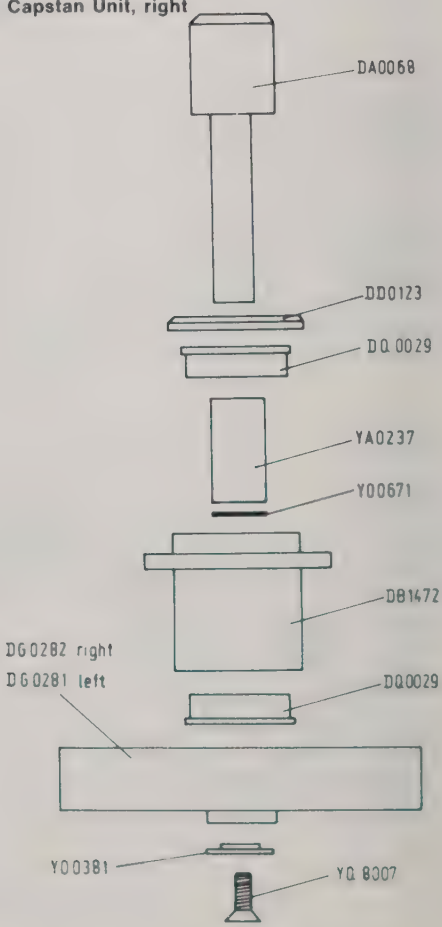
UA 0389 Fast Forward Idler



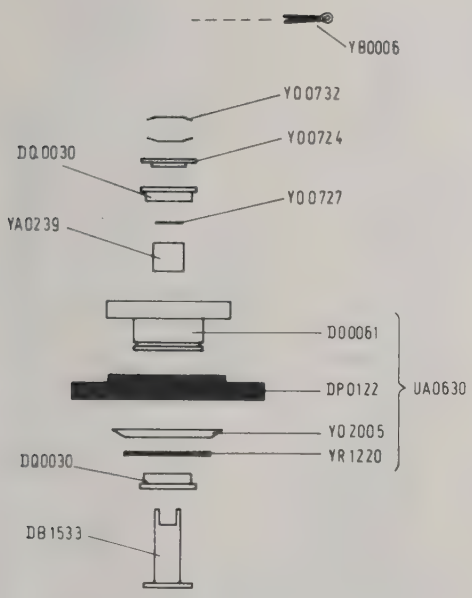
UA 0390 Tape Tension Roller

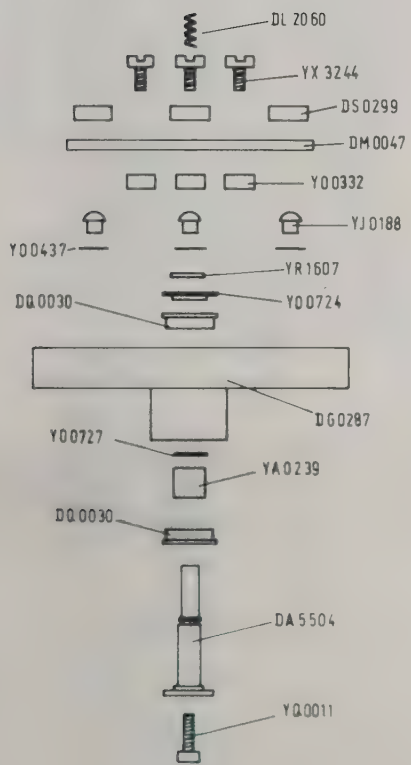


UD 0022 Capstan Unit, left
UD 0023 Capstan Unit, right

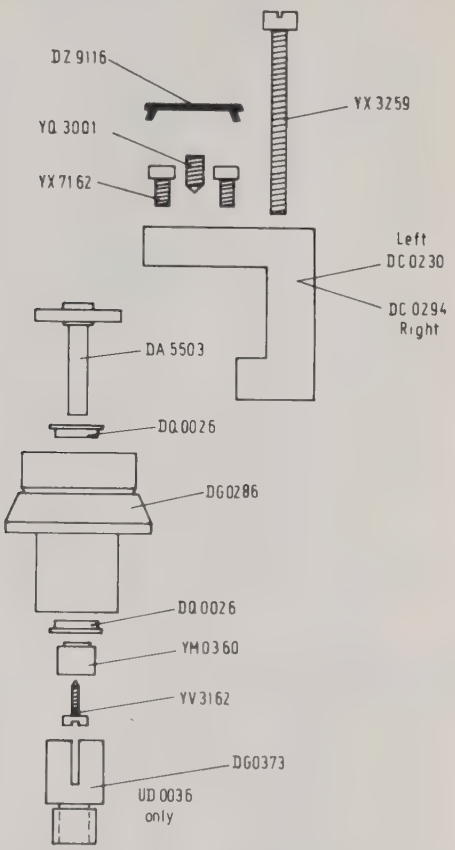


UD 0027 Center Drive Unit

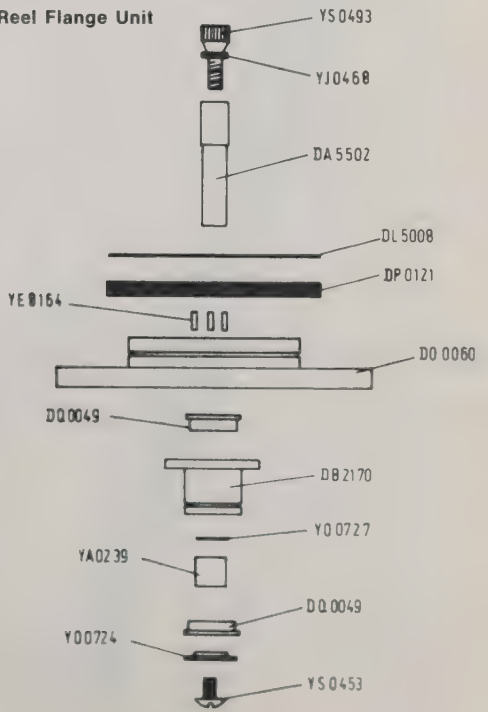




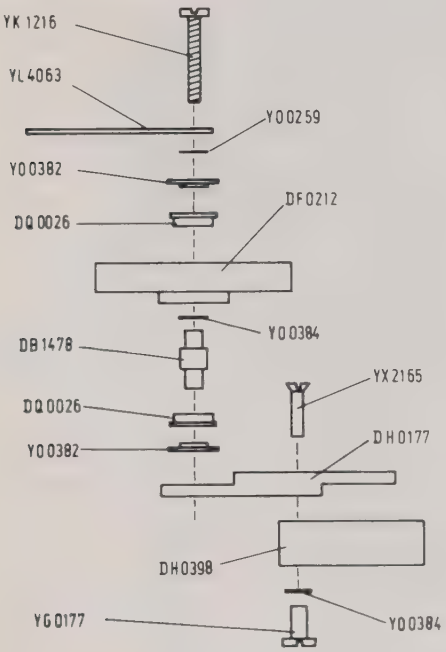
UD 0026 Guide Roller Unit, left
UD 0036 Guide Roller Unit, right



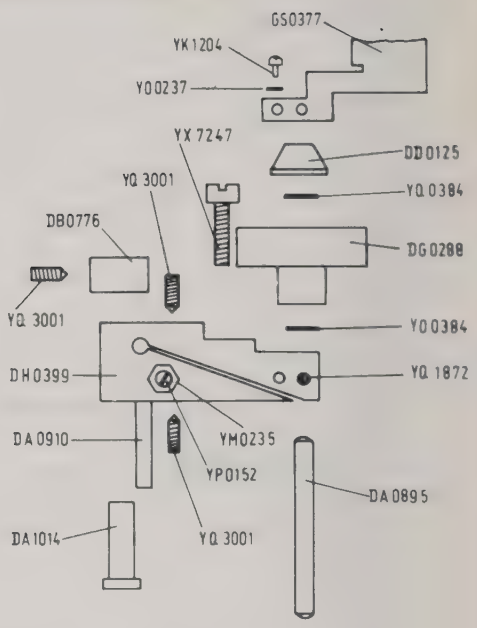
UD 0048 Reel Flange Unit



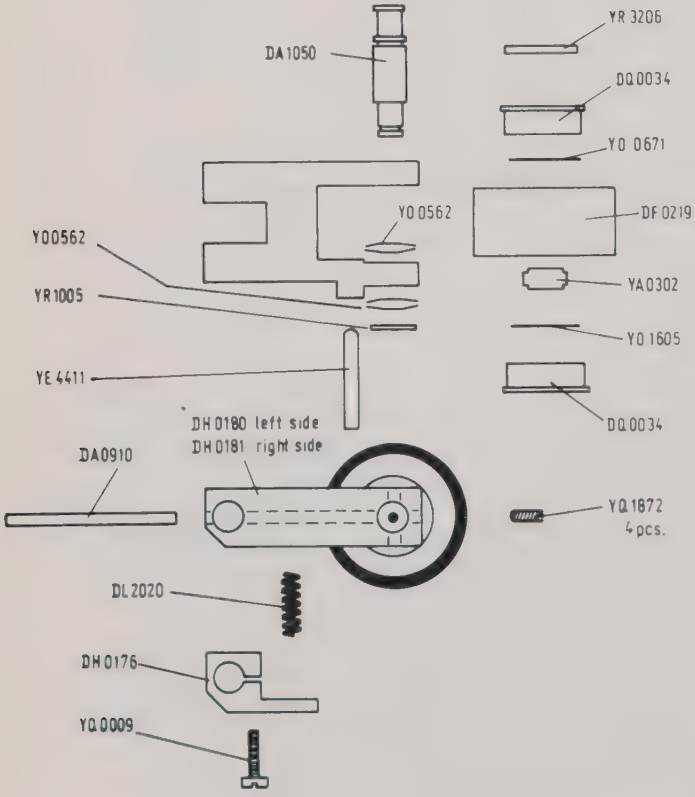
UD 0049 Take-up Idler Unit



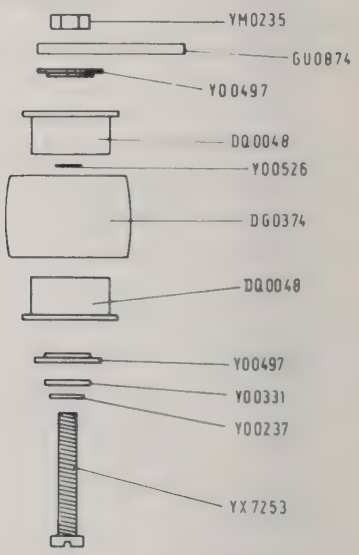
UD 0050 Center Guide Roller



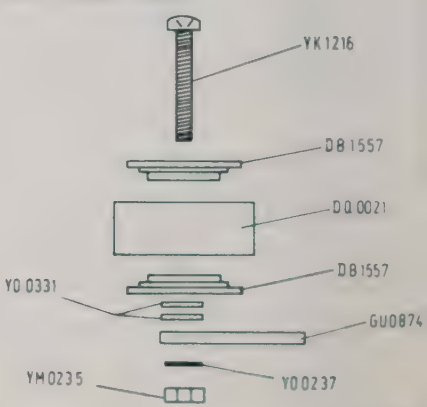
UD 0030 Pinch Roller, left
UD 0031 Pinch Roller, right

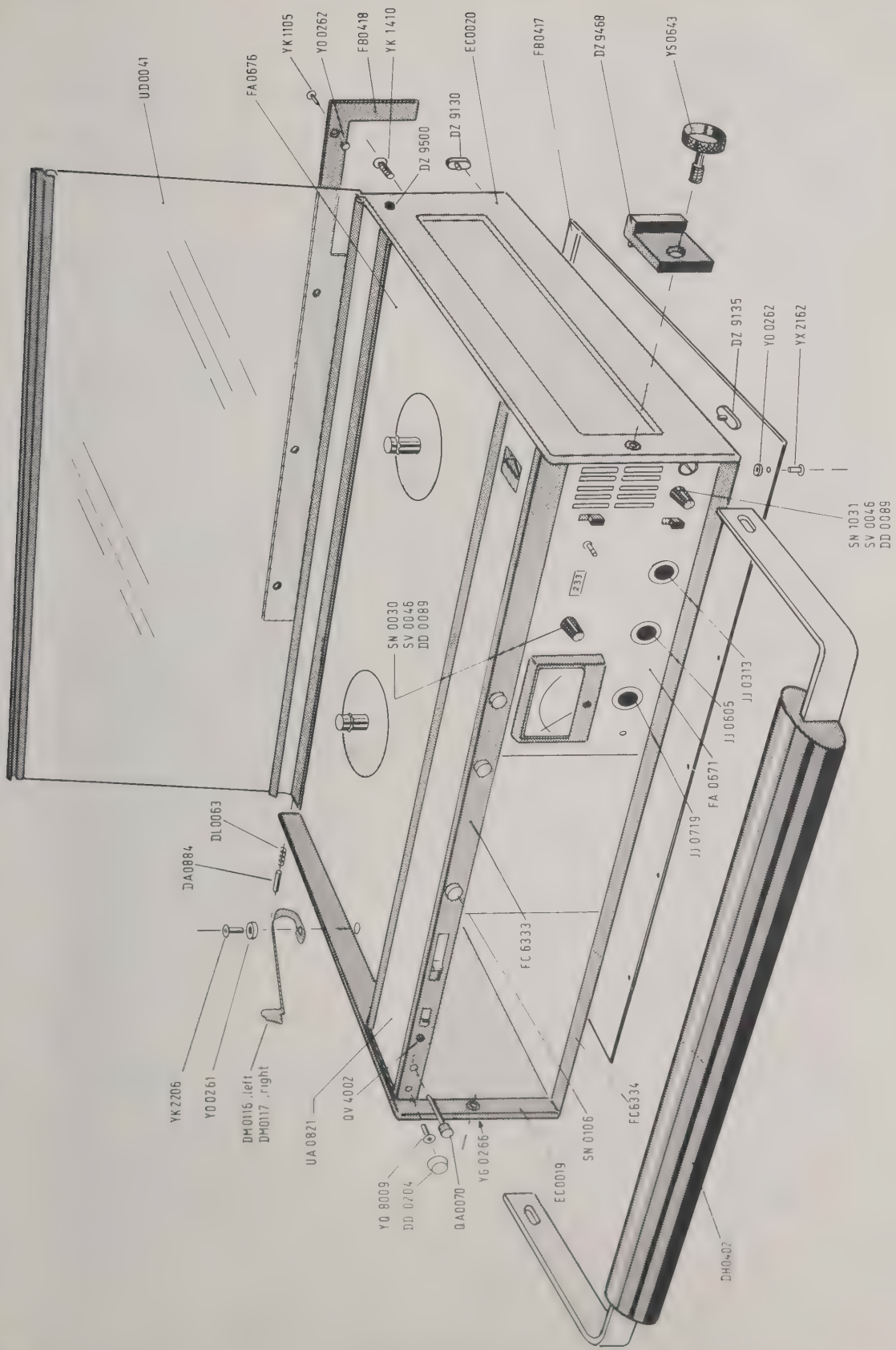


UD 0051 Belt Guide Roller



UD 0052 Belt Tension Roller




UD0041
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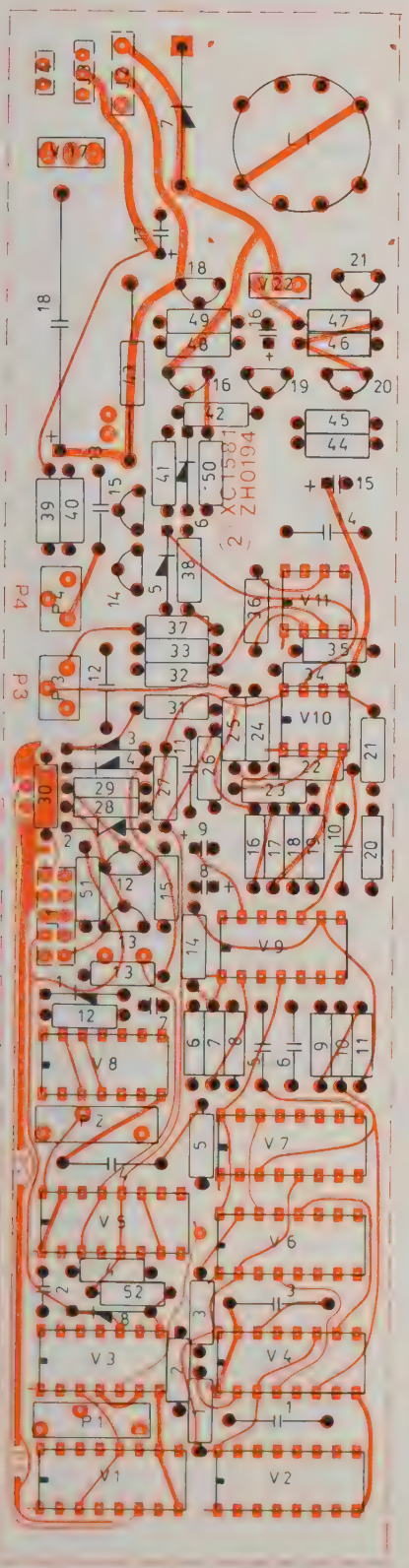
YO0262
FB0418
YK1410
EC0020
DZ9500
DZ9130
FB0417
DZ9468
YS0643
DZ9135
YO0262
YX2162
SN1031
SV0046
DD0089
SN0030
SV0046
DD0089
JJ0313
JJ0605
FA0671
JJ0719
DL0063
DA0884
FC6333
YK2206
YO0261
DM0116 ,left
DM0117 ,right
UA0821
QV4002
YO8009
DD0204
DA0070
YG0266
EC0019
SN0106
FC6334
DH0402

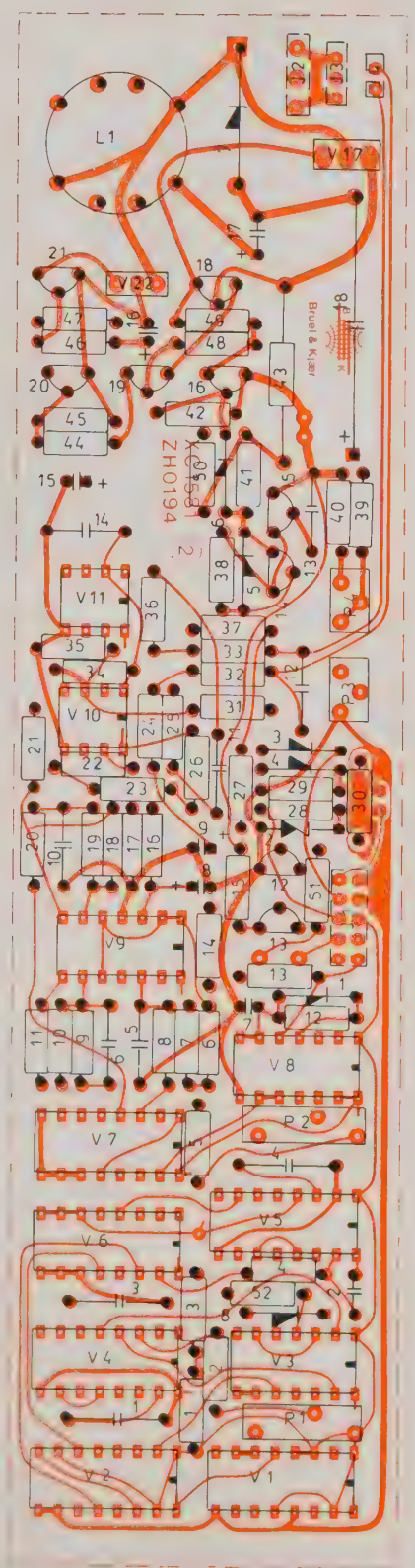
Motor Servo Board

ZH 0194

LAYOUT DIAGRAM



Viewed from the component side



Viewed from the solder side

C Q Q R V

ZH 0194 Motor Servo Board

PARTS LIST

Note: Add 1400 to all position numbers.

C 1	Polystyrene	1%	2,4 nF/ 63 V	CT 1129
C 2	Ceramic		2,2 nF/400 V	CK 3221
C 3,4	Polystyrene	1%	2,4 nF/ 63 V	CT 1129
C 5	Polyester		15 nF/400 V	CS 0431
C 6	-		10 nF/400 V	CS 0430
C 7	Electrolytic		2,2 µF/ 63 V	CE 0541
C 8	Tantalum		0,15 µF/ 35 V	CF 0050
C 9	Electrolytic		2,2 µF/ 63 V	CE 0541
C 10	Polyester		0,22 µF/ 63 V	CS 0438
C 11	-		33 nF/250 V	CS 0433
C 12	-		0,1 µF/100 V	CS 0436
C 13	-		10 nF/400 V	CS 0430
C 14	-		0,22 µF/ 63 V	CS 0438
C 15	Electrolytic		1 µF/ 63 V	CE 0540
C 16	-		10 µF/ 40 V	CE 0473
C 17	-		47 µF/ 63 V	CE 0542
C 18	-		470 µF/ 16 V	CE 0337
L 1	Coil			LB 0944
P 1	Cermet		10 kΩ	PG 3123
P 2	-		20 kΩ	PG 3206
P 3	-		100 kΩ	PG 4112
P 4	-		1 kΩ	PG 2114

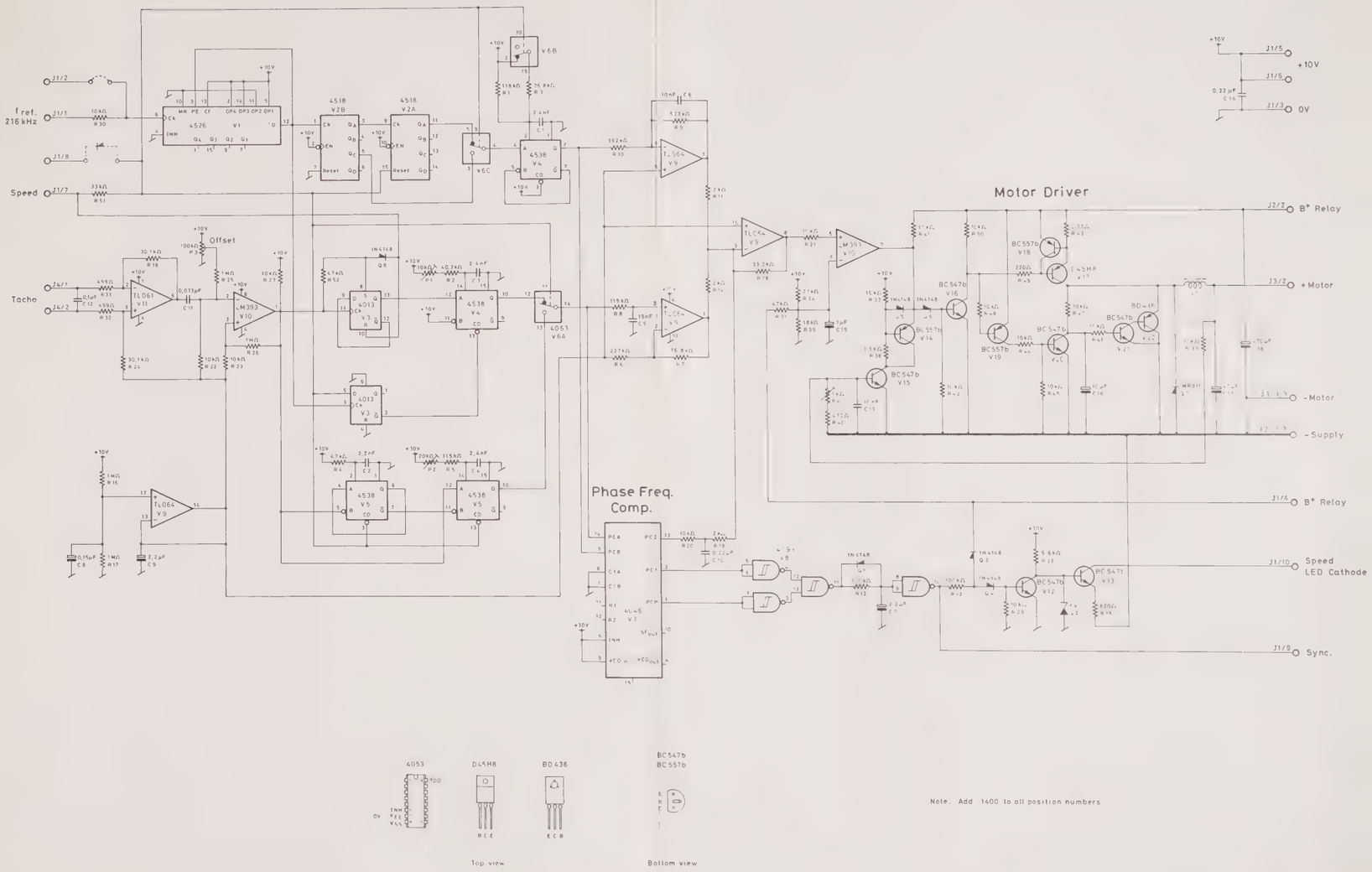
Q 1	Si.	1N4148	75 V/75 mA	QV 0216
Q 2	Ze.	BZC79	4,8-5,4 V/0,25 W	QV 1339
Q 3-6	Si.	1N4148	75 V/75 mA	QV 0216
Q 7	-	MR911	100 V/3 A	QV 0253
Q 8	-	1N4148	75 V/75 mA	QV 0216

R 1	Metal	1/4 W	1%	118 kΩ	RF 5118
R 2	-	-	-	40,2 kΩ	RF 4402
R 3	-	-	-	76,8 kΩ	RF 4768
R 4	Carbon	-	5%	47 kΩ	RB 4470
R 5	Metal	-	1%	115 kΩ	RF 5115
R 6	-	-	-	237 kΩ	RF 5237
R 7	-	-	-	76,8 kΩ	RF 4768
R 8	-	-	-	115 kΩ	RF 5115
R 9	-	-	-	523 kΩ	RF 5523
R 10	-	-	-	392 kΩ	RF 5392
R 11	-	-	-	2,00 kΩ	RF 3200
R 12,13	Carbon	-	5%	100 kΩ	RB 5100
R 14	Metal	-	1%	2,00 kΩ	RF 3200
R 15	Carbon	1/4 W	5%	820 Ω	RB 2820
R 16,17	Metal	-	1%	1,00 MΩ	RF 6100
R 18	-	-	-	33,2 kΩ	RF 4332
R 19	-	-	-	2,00 kΩ	RF 3200
R 20-23	Carbon	-	5%	10 kΩ	RB 4100
R 24	Metal	-	1%	30,1 kΩ	RF 4301
R 25,26	Carbon	-	5%	1,0 MΩ	RB 6100
R 27	-	-	-	10 kΩ	RB 4100
R 28	-	-	-	5,6 kΩ	RB 3560
R 29,30	-	-	-	10 kΩ	RB 4100
R 31	-	-	-	47 kΩ	RB 4470
R 32,33	Metal	-	1%	499 Ω	RF 2499
R 34	Carbon	-	5%	27 kΩ	RB 4270
R 35	-	-	-	18 kΩ	RB 4180
R 36	Metal	-	1%	30,1 kΩ	RF 4301
R 37	Carbon	-	5%	10 kΩ	RB 4100
R 38	-	-	-	3,3 kΩ	RB 3330
R 39	-	-	-	10 kΩ	RB 4100
R 40	-	-	-	470 Ω	RB 2470
R 41,42	-	-	-	10 kΩ	RB 4100
R 43	Wire	4 W	10%	0,33 Ω	RO 1220
R 44-48	Carbon	1/4 W	5%	10 kΩ	RB 4100
R 49	-	-	-	220 Ω	RB 2220
R 50	-	-	-	10 kΩ	RB 4100
R 51	-	-	-	33 kΩ	RB 4330
R 52	-	-	-	47 kΩ	RB 4470

V 1	Program. Down Counter	4526	VD 2115
V 2	2 × BCD Counter/Divider	4518B	VD 2036
V 3	2 × Set/Reset D Flip-Flop	4013B	VD 2068
V 4,5	2 × Precision Monost.Multiv.	4538	VD 2097
V 6	3 × 2-Ch.Multi-/Demultipl.	4053B	VD 2087
V 7	Microp. Phase-Locked Loop	4046B	VD 2071
V 8	4 × 2 NAND Schmitt Trig.	4093B	VD 2081
V 9	Op.Amp.	TL064	VD 0151
V 10	Comparator	LM393N	VE 0163
V 11	Op.Amp.	TL061	VE 0135
V 12,13	Silicon	BC547b	VB 0603
V 14	-	BC557b	VB 0135
V 15,16	-	BC547b	VB 0603
V 17	-	D45H8	VB 0127
V 18,19	-	BC557b	VB 0135
V 20,21	-	BC547b	VB 0603
V 22	-	BD436	VB 0120

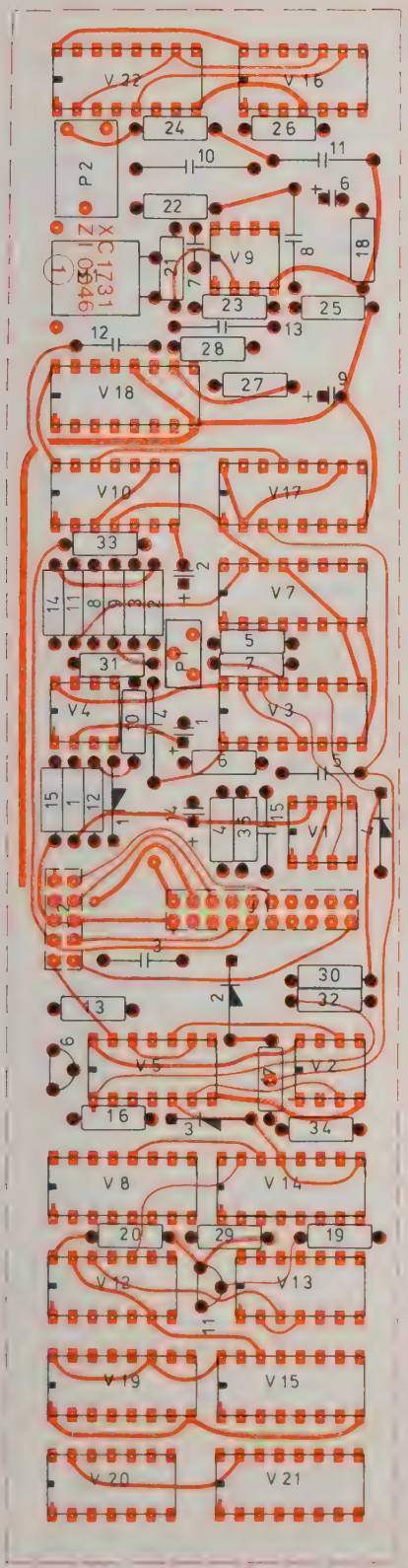
14-pin socket	JJ 1416
16-pin socket	JJ 1631
Printed Circuit Board	XC 1581

Motor Servo Board ZH 0194

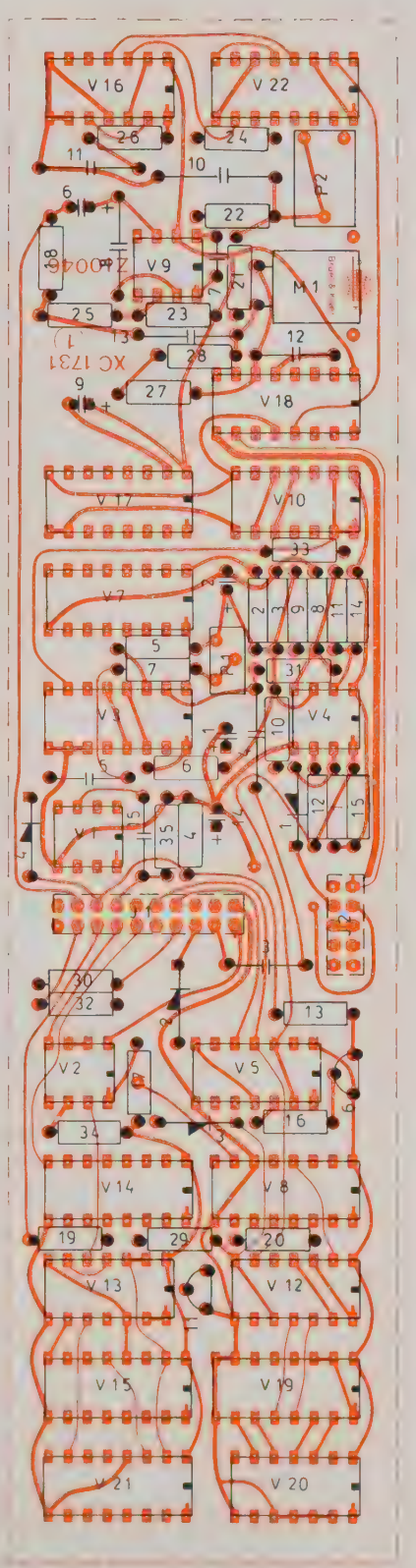


Note. Add 1400 to all position numbers

903768 - 790821 - ZH 0194 - 7005 6
1110404 - 830912 - ZH 0194 - 7007



Viewed from the component side



Viewed from the solder side

C R V

ZI 0046 Reference Oscillator Board

PARTS LIST

Note: Add 1600 to all position numbers.

C 1,2	Electrolytic		33 µF/ 16 V	CE 0346
C 3	Polycarbonate		10 nF/400 V	CS 0129
C 4	Polystyrene	1%	1,2 nF/ 63 V	CT 1149
C 5	Polycarbonate		220 nF/ 63 V	CS 0438
C 6	Electrolytic		4,7 µF/ 40 V	CE 0475
C 7	Ceramic	5%	33 pF/400 V	CK 1330
C 8	Polystyrene	1%	270 pF/125 V	CT 1143
C 9	Electrolytic		10 µF/ 40 V	CE 0473
C 10	Polystyrene	1%	15 nF/ 63 V	CT 1515
C 11	-	-	10 nF/ 30 V	CT 1552
C 12	-	5%	33 pF/125 V	CT 0502
C 13	-	1%	270 pF/125 V	CT 1143
C 14	Electrolytic		10 µF/ 40 V	CE 0473
C 15	Polycarbonate		220 nF/ 63 V	CS 0438

M 1	X-tal	MB 0020

P 1	Cermet	20 kΩ	PG 3209
P 2	-	50 kΩ	PG 3516

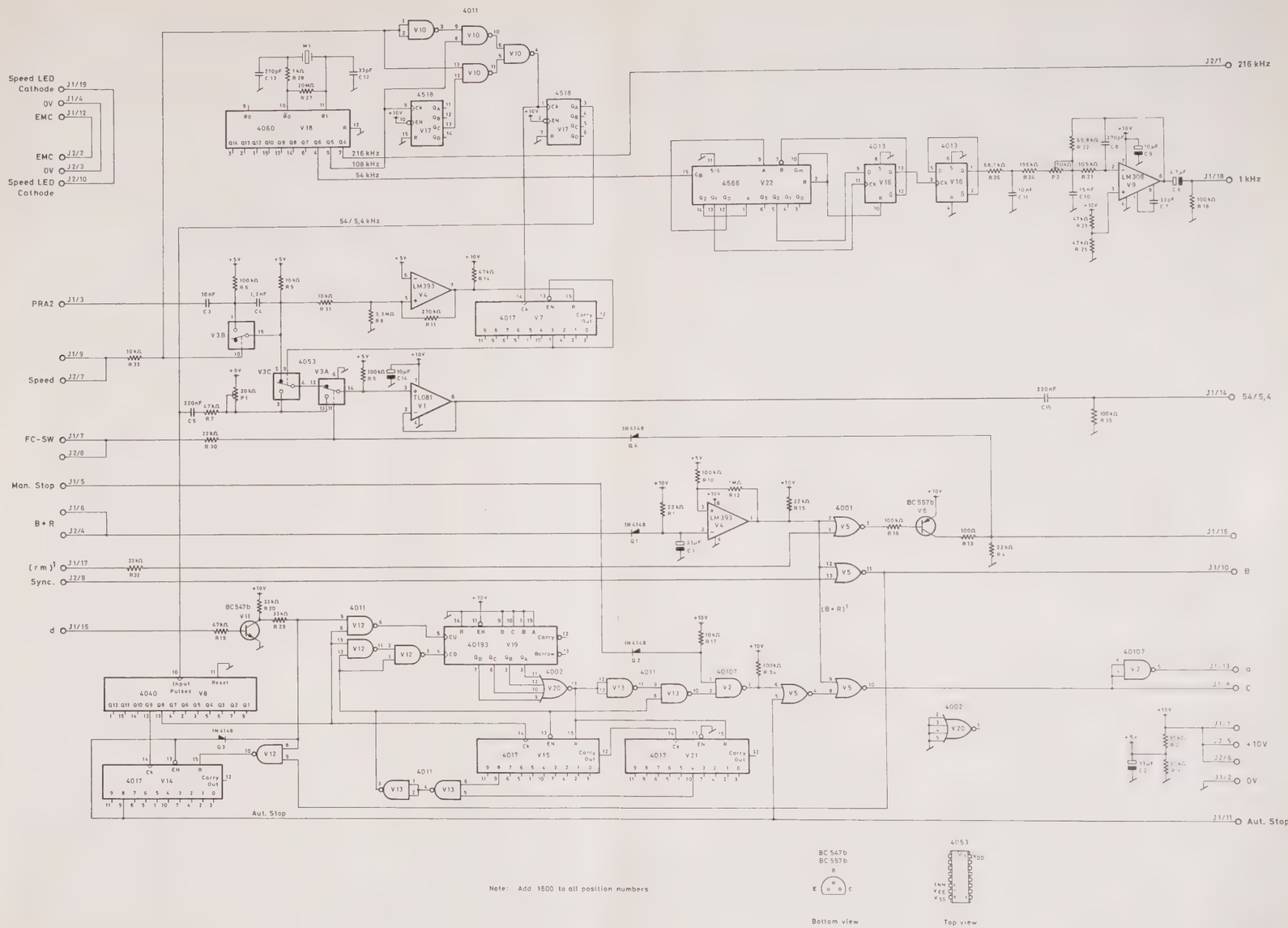
Q 1-4	Si. 1N4148	75 V/75 mA	QV 0216

R 1	Carbon	1/4 W	5%	22 kΩ	RB 4220
R 2,3	-	-	-	10 kΩ	RB 4100
R 4	-	-	-	22 kΩ	RB 4220
R 5,6	-	-	-	100 kΩ	RB 5100
R 7	-	-	-	47 kΩ	RB 4470
R 8	-	-	-	3,3 MΩ	RB 6330
R 9	-	-	-	10 kΩ	RB 4100
R 10	-	-	-	100 kΩ	RB 5100
R 11	-	-	-	270 kΩ	RB 5270
R 12	-	-	-	1,0 MΩ	RB 6100
R 13	-	-	-	100 Ω	RB 2100
R 14	-	-	-	47 kΩ	RB 4470
R 15	-	-	-	22 kΩ	RB 4220
R 16	-	-	-	100 kΩ	RB 5100
R 17	-	-	-	10 kΩ	RB 4100
R 18	-	-	-	100 kΩ	RB 5100
R 19	Carbon	1/4 W	5%	47 kΩ	RB 4470
R 20	-	-	-	33 kΩ	RB 4330
R 21	Metal	-	1%	105 kΩ	RF 5105
R 22	-	-	-	69,8 kΩ	RF 4698
R 23	Carbon	-	5%	47 kΩ	RB 4470
R 24	Metal	-	1%	196 kΩ	RF 5196
R 25	Carbon	-	5%	47 kΩ	RF 4470
R 26	Metal	-	1%	68,1 kΩ	RF 4681
R 27	Carbon	-	5%	20 MΩ	RH 0903
R 28	-	-	-	1,0 kΩ	RB 3100
R 29	-	-	-	33 kΩ	RB 4330
R 30	-	-	-	22 kΩ	RB 4220
R 31	-	-	-	10 kΩ	RB 4100
R 32	-	-	-	22 kΩ	RB 4220
R 33	-	-	-	10 kΩ	RB 4100
R 34,35	-	-	-	100 kΩ	RB 5100

V 1	Op.Amp.	TL081	VE 0142
V 2	2 × 2 Input NAND Driver	40107B	VD 2101
V 3	3 × 2-Ch.Multi-/Demultiplex.	4053	VD 2087
V 4	2 × Comparator	LM393N	VE 0163
V 5	4 × 2 Input NOR	4001	VD 2000
V 6	Silicon	BC557b	VB 0135
V 7	Decade Counter/Divider	4017	VD 2009
V 8	12-St. Bin./Ripple Counter	4040	VD 2021
V 9	Op.Amp.	LM308	VE 0046
V 10	4 × 2 Input NAND	4011	VD 2004
V 11	Silicon	BC547b	VB 0603
V 12,13	4 × 2 Input NAND	4011	VD 2004
V 14,15	Decade Counter/Divider	4017	VD 2009
V 16	2 × Set/Reset D Flip-Flop	4013B	VD 2068
V 17	2 × BCD Counter/Divider	4518	VD 2036
V 18	14-St. Count./Div. and Osc.	4060	VD 2064
V 19	4-bit Up/Down Bin.Counter	40193B	VD 2050
V 20	2 × 4 Input NOR	4002	VD 2001
V 21	Decade Counter/Divider	4017	VD 2009
V 22	Industrial Time Base Gen.	4566B	VD 2085

8-pin socket	JJ 0817
16-pin socket	JJ 1631
Printed Circuit Board	XC 1731

Reference Oscillator Board ZI 0046



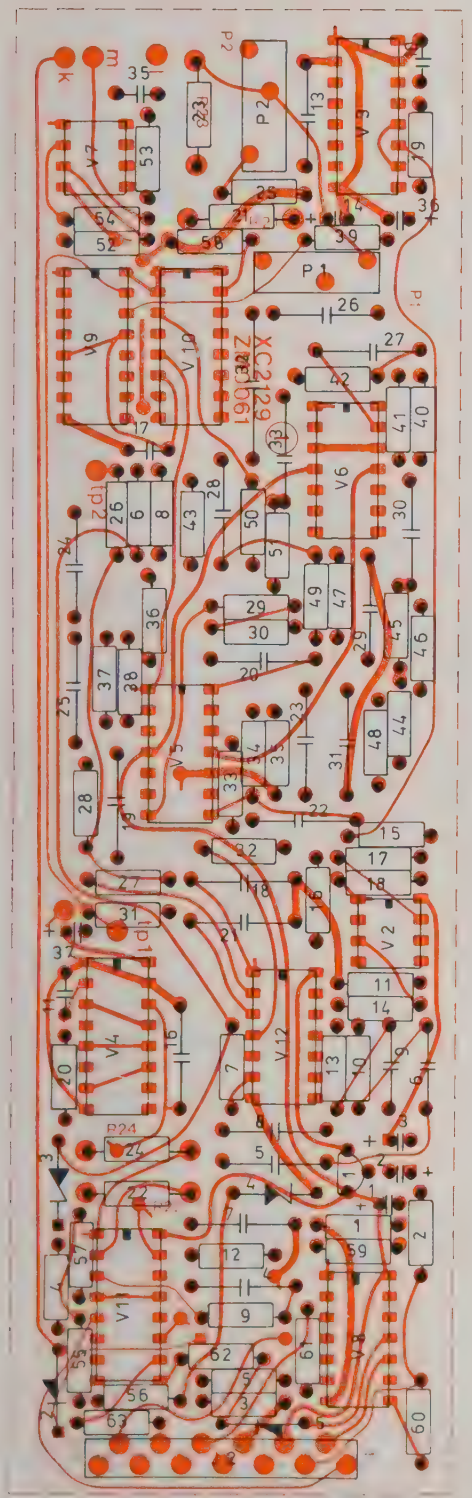
903768 - 790821 - ZI 0046 - 7005 6
1110404 - 830912 - ZI 0046 - 7007

Vibration Unit

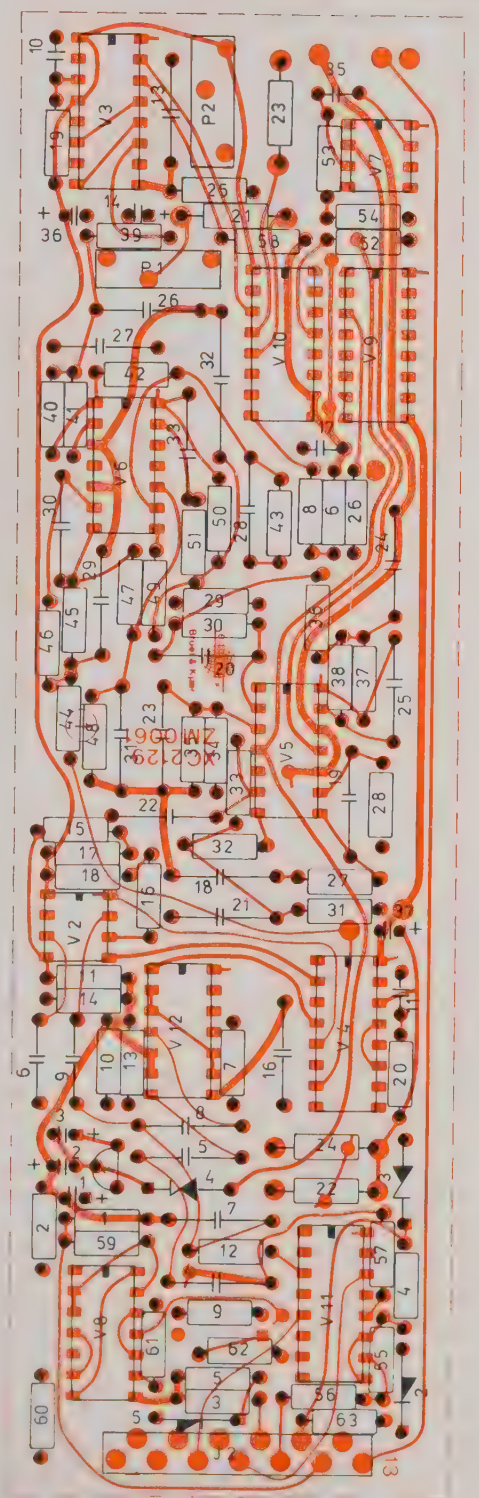
ZM 0060

Demodulator ZM 0061

LAYOUT DIAGRAM



Viewed from the component side



Viewed from the solder side

C — Q — Q — R — V

ZM 0060 Vibration Unit

ZM 0061 Demodulator

PARTS LIST

Note: Add 2400 to all position numbers

C 1	Tantalum		10 µF/16 V	CF 0059
C 2	-		2,2 µF/20 V	CF 0022
C 3	-		10 µF/16 V	CF 0059
C 4	Polystyrene	1%	68 pF/630 V	CT 1191
C 5	-	-	620 pF/125 V	CT 1109
C 6	Polyester		22 nF/400 V	CS 0432
C 7	Polystyrene	1%	68 pF/630 V	CT 1191
C 8	-	-	620 pF/125 V	CT 1109
C 9	Polyester		22 nF/400 V	CS 0432
C 10,11	Ceramic		100 pF/400 V	CK 2103
C 13	Polystyrene	1%	330 pF/125 V	CT 1144
C 14	Tantalum		1 µF/35 V	CF 0062
C 16	Polystyrene	1%	330 pF/125 V	CT 1144
C 17	Ceramic	5%	22 pF/400 V	Ck 1220
C 18	Polystyrene	1%	1 nF/63 V	CT 1132
C 19	-	-	330 pF/125 V	CT 1144
C 20	-	-	470 pF/125 V	CT 1111
C 21	-	-	300 pF/125 V	CT 1112
C 22	-	-	82 pF/160 V	CT 1162
C 23	-	-	470 pF/125 V	CT 1111
C 24	-	-	1,8 nF/63 V	CT 1153
C 25	-	-	75 pF/125 V	CT 1128
C 26	-	-	10 nF/30 V	CT 1552
C 27	-	-	3,3 nF/30 V	CT 1544
C 28	-	-	4,7 nF/30 V	CT 1566
C 29	-	-	3 nF/30 V	CT 1157
C 30	-	-	820 pF/63 V	CT 1121
C 31	-	-	4,7 nF/30 V	CT 1566
C 32	-	-	18 nF/63 V	CT 1516
C 33	-	-	750 pF/125 V	CT 1146
C 35	Ceramic		100 pF/400 V	CK 2103
C 36,37	Tantalum		2,2 µF/20 V	CF 0022

R 1-8	Carbon	1/4 W	5%	47 kΩ RB 4470
R 9-12	Metal	-	1%	10,0 kΩ RF 4100
R 13	-	-	-	100 kΩ RF 5100
R 14	-	-	-	10,0 kΩ RF 4100
R 15,16	Carbon	-	5%	470 kΩ RB 5470
R 17,18	-	-	-	10 kΩ RB 4100
R 19,20	-	-	-	18 kΩ RB 4180
R 21,22	Metal	-	1%	13,3 kΩ RF 4133
R 23,24	-	-	-	133 kΩ RF 5133
R 25	-	-	-	10,0 kΩ RF 4100
R 26,27	-	-	-	44,2 kΩ RF 4442
R 28	-	-	-	22,1 kΩ RF 4221
R 29,30	-	-	-	15,8 kΩ RF 4158
R 31,32	-	-	-	44,2 kΩ RF 4442
R 33	-	-	-	52,3 kΩ RF 4523
R 34,35	-	-	-	15,8 kΩ RF 4158
R 36,37	-	-	-	19,6 kΩ RF 4196
R 38	-	-	-	17,4 kΩ RF 4174
R 39,40	-	-	-	44,2 kΩ RF 4442
R 41	-	-	-	22,1 kΩ RF 4221
R 42,43	-	-	-	15,8 kΩ RF 4158
R 44,45	-	-	-	44,2 kΩ RF 4442
R 46	-	-	-	52,3 kΩ RF 4523
R 47,48	-	-	-	15,8 kΩ RF 4158
R 49,50	-	-	-	20,0 kΩ RF 4200
R 51	-	-	-	21,0 kΩ RF 4210
R 52	Carbon	-	5%	47 kΩ RB 4470
R 53	-	-	-	100 Ω RB 2100
R 54	-	-	-	10 kΩ RB 4100
R 55,56	-	-	-	100 kΩ RB 5100
R 57	-	-	-	22 kΩ RB 4220
R 58	-	-	-	47 kΩ RB 4470
R 59-63	-	-	-	10 kΩ RB 4100

J 2	13-pin plug			JP 1301
P 1,2	Cermet		500 Ω	PG 1511
Q 2	Si.	1N4148	75 V/75 mA	QV 0216
Q 3	Ze.	BZX79	5,3-5,9 V/0,25 W	QV 1105
Q 4	-	BZX79	6,1-6,3 V/0,25 W	QV 1372
Q 5	Si.	1N4148	75 V/75 mA	QV 0216

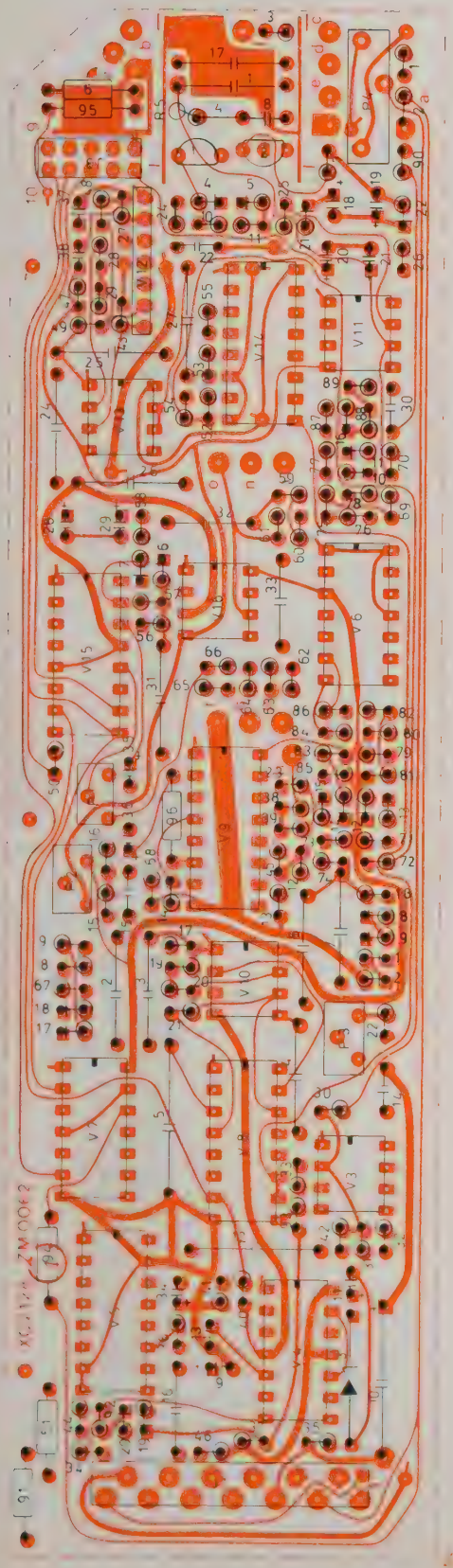
V 1	Fixed Voltage Regulator	78L08	VE 0173
V 2	Comparator	LM393	VE 0163
V 3,4	2 × Monostable Multivibr.	4528	VD 2032
V 5,6	Op.Amp.	TL064	VE 0151
V 7	- -	TL081	VE 0142
V 8	4 × 2 Inp.NOR	4001	VD 2000
V 9	Decade Counter/Div w.Dec	4017	VD 2009
V 10,11	3 × 2-ch. Multi-/Demultip.	4053	VD 2087
V 12	4 × Bilateral Switch	4066	VD 2008

8-pin socket	JJ 0817
14-pin socket	JJ 1416
16-pin socket	JJ 1631
Printed Circuit Board	XC 2129

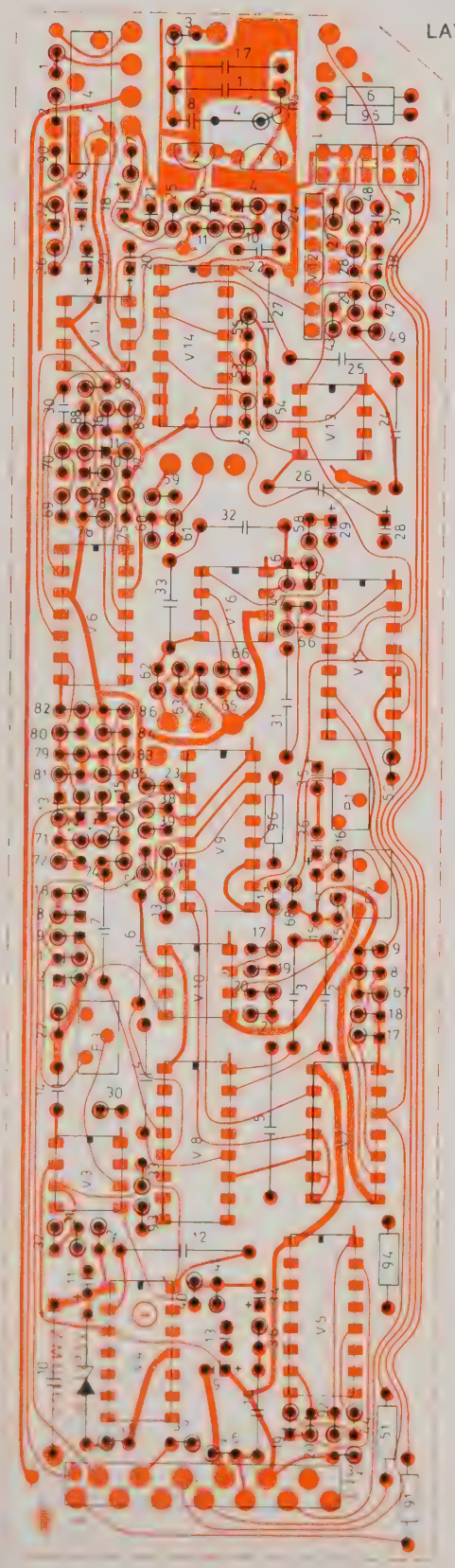
Vibration Unit ZM 0060

Modulator ZM 0062

LAYOUT DIAGRAM



Viewed from the component side



Viewed from the solder side

Note: Add 2500 to all position numbers.

C 1	Polystyrene	1%	430 pF/125 V	CT 1145	R 1	Carbon	1/4 W	5%	100 kΩ	RB 5100
C 2	-	-	84,5 pF/63 V	CT 1570	R 2	-	-	-	2,2 kΩ	RB 3220
C 3	-	-	680 pF/125 V	CT 1134	R 3	Metal	-	1%	47,5 Ω	RF 1475
C 4	-	-	2,7 nF/63 V	CT 1158	R 4	-	-	-	51,1 Ω	RF 1511
C 5	-	-	27 nF/63 V	CT 1518	R 5	Carbon	-	20%	3,3 GΩ	RH 0021
C 6	-	-	82 pF/400 V	CT 1188	R 6	Metal	-	1%	210 Ω	RF 2210
C 7	-	-	1,1 nF/30 V	CT 1148	R 7	-	-	-	15,0 kΩ	RF 4150
C 8	Polycarbonate		0,15 µF/100 V	CS 0459	R 8,9	Carbon	-	5%	220 kΩ	RB 5220
C 9	Tantalum		22 µF/16 V	CF 0031	R 10,11	Metal	-	1%	10,0 kΩ	RF 4100
C 10	Electrolytic		100 µF/25 V	CE 0490	R 12	-	-	-	100 kΩ	RF 5100
C 11	Tantalum		15 µF/10 V	CF 0016	R 13	-	-	-	52,3 kΩ	RF 4523
C 12	Glass		1 nF/300 V	CG 0001	R 14	-	-	-	36,5 kΩ	RF 4365
C 13	Ceramic		220 pF/63 V	CK 2221	R 15	Carbon	-	5%	2,2 kΩ	RB 3220
C 14	-		100 pF/400 V	CK 2103	R 16	-	-	-	1,0 MΩ	RB 6100
C 15	-		47 nF/16 V	CK 4471	R 17	Metal	-	1%	93,1 kΩ	RF 4931
C 16	Polyester		100 nF/100 V	CS 0436	R 18	-	-	-	5,23 kΩ	RF 3523
C 17	Polystyrene	1%	100 pF/125 V	CT 1133	R 19	-	-	-	3,92 kΩ	RF 3392
C 18,19	Tantalum		15 µF/10 V	CF 0016	R 20	-	-	-	12,1 kΩ	RF 4121
C 20,21	-		33 µF	CF 0082	R 21	-	-	-	11,3 kΩ	RF 4113
C 22	Ceramic		330 pF/400 V	CK 2334	R 22	-	-	-	8,25 kΩ	RF 3825
C 23	-		1,5 nF/100 V	CK 3153	R 23	Carbon	-	5%	100 kΩ	RB 5100
C 24	Polystyrene	1%	1,1 nF/30 V	CT 1148	R 24	Metal	-	1%	1,00 kΩ	RF 3100
C 25	-	-	5,1 nF/63 V	CT 1179	R 25	-	-	-	2,94 kΩ	RF 3294
C 26	-	-	470 pF/125 V	CT 1111	R 26	-	-	-	3,32 kΩ	RF 3332
C 27	-	-	2,2 nF/63 V	CT 1126	R 27	-	-	-	1,00 MΩ	RF 6100
C 28,29	Tantalum		22 µF/16 V	CF 0031	R 28,29	-	-	-	10,0 kΩ	RF 4100
C 30	Ceramic		47 nF/16 V	CK 4471	R 30	Carbon	-	5%	180 kΩ	RB 5180
C 31	Polystyrene	1%	10 nF/30 V	CT 1552	R 31	Metal	-	1%	14,3 kΩ	RF 4143
C 32,33	Polycarbonate		330 nF/63 V	CS 0456	R 32	-	-	-	7,87 kΩ	RF 3787
C 34	Tantalum		3,3 µF/16 V	CF 0014	R 33	-	-	-	16,5 kΩ	RF 4165
C 35,36	-		100 µF/3 V	CF 0019	R 34	Carbon	-	5%	10 kΩ	RB 4100
C 37,38	Ceramic		10 nF/100 V	CK 4106	R 35	Metal	-	1%	3,92 kΩ	RF 3392
					R 36	-	-	-	4,02 kΩ	RF 3402
					R 37	Carbon	-	5%	47 kΩ	RB 4470
J 1	13-pin DIN socket			JP 1301	R 38	Metal	-	1%	1,02 kΩ	RF 3102
J 3	Wire-wrap-pin			JL 1001	R 39	-	-	-	4,12 kΩ	RF 3412
					R 40,41	Carbon	-	5%	47 kΩ	RB 4470
					R 42	Metal	-	1%	15,0 kΩ	RF 4150
L 1	H F coil			LB 0991	R 43	-	-	-	909 Ω	RF 2909
					R 44	Carbon	-	5%	100 kΩ	RB 5100
					R 45	Metal	-	1%	56,2 kΩ	RF 4562
P 1	Cermet	lin.	2 kΩ	PG 2212	R 46	-	-	-	1,50 kΩ	RF 3150
P 2	-	-	200 kΩ	PG 4207	R 47	-	-	-	10,0 kΩ	RF 4100
P 3	-	-	5 kΩ	PG 2520	R 48	-	-	-	210 Ω	RF 2210
P 4	-	-	100 kΩ	PG 4110	R 49	-	-	-	10,2 kΩ	RF 4102
					R 50	Carbon	-	5%	100 kΩ	RB 5100
					R 51	Metal	-	1%	22,1 kΩ	RF 4221
Q 1,2	Ze.	BA314	0,68-0,76 V/0,25 W	QV 1385	R 52	-	-	-	8,66 kΩ	RF 3866
Q 3	Si.	1N4567	5,53-6,66 V/0,40 W	QV 0048	R 53	-	-	-	6,34 kΩ	RF 3634
Q 4,5	-	1N4148	75 V/75 mA	QV 0216	R 54	-	-	-	66,5 kΩ	RF 4665
Q 6,7	-	FDH300	150 V/200 mA	QV 0242	R 55	-	-	-	47,5 kΩ	RF 4475
Q 8,9	Ze.	BA314	0,68-0,76 V/0,25 W	QV 1385	R 56	-	-	-	100 kΩ	RF 5100
Q 10-20	Si.	1N4148	75 V/75 mA	QV 0216	R 57	Carbon	-	10%	39 MΩ	RH 0003
Q 21,22	Ze.	1N4738A	7,8-8,6 V/0,25 W	QV 1344	R 58	Metal	-	1%	110 kΩ	RF 5110

ZM 0060 Vibration Unit

ZM 0062 Modulator

PARTS LIST

R 59	Metal	1/4 W	1%	35,7 kΩ	RF 4357
R 60	-	-	-	301 kΩ	RF 5301
R 61	-	-	-	422 kΩ	RF 5422
R 62	-	-	-	71,5 kΩ	RF 4715
R 63	-	-	-	715 kΩ	RF 5715
R 64	-	-	-	3,65 MΩ	RH 6365
R 65	-	-	-	100 Ω	RF 2100
R 66	-	-	-	909 Ω	RF 2909
R 67	Carbon	-	5%	220 kΩ	RB 5220
R 68	Metal	-	1%	8,06 kΩ	RF 3806
R 69	-	-	-	1,40 MΩ	RH 6140
R 70	-	-	-	340 kΩ	RF 5340
R 71	-	-	-	665 kΩ	RF 5665
R 72	-	-	-	165 kΩ	RF 5165
R 73	-	-	-	110 kΩ	RF 5110
R 74	-	-	-	27,4 kΩ	RF 4274
R 75	-	-	-	158 kΩ	RF 5158
R 76	-	-	-	49,9 kΩ	RF 4499
R 77	-	-	-	237 kΩ	RF 5237
R 78	-	-	-	45,3 kΩ	RF 4453
R 79	-	-	-	158 kΩ	RF 5158
R 80	-	-	-	49,9 kΩ	RF 4499
R 81	-	-	-	237 kΩ	RF 5237
R 82	-	-	-	45,3 kΩ	RF 4453
R 83	-	-	-	158 kΩ	RF 5158
R 84	-	-	-	49,9 kΩ	RF 4499
R 85	-	-	-	237 kΩ	RF 5237
R 86	-	-	-	45,3 kΩ	RF 4453
R 87	Carbon	-	5%	1,0 MΩ	RB 6100
R 88	-	-	-	100 kΩ	RB 5100
R 89	-	-	-	390 kΩ	RB 5390
R 90	-	-	-	2,2 kΩ	RB 3220
R 91	-	-	-	10 kΩ	RB 4100
R 92	-	-	-	100 kΩ	RB 5100
R 93,94	-	-	-	22 kΩ	RB 4220
R 95	Metal	-	1%	140 kΩ	RF 5140
R 96	-	-	-	90,9 kΩ	RF 4909

V 1,2	FET	2SK117 VB 1094
V 3	Op.Amp	LM308 VE 0046
V 4	V/F Converter	VFC32 VE 0164
V 5	2 × BCD Counter/Divider	4518 VD 2036
V 6	Comparator	339N VE 0110
V 7	4 × 2 Input NOR	4001 VD 2000
V 8,9	3 × 2-ch. Multi-/Demultip.	4053 VD 2087
V 10	Op.Amp.	TL062 VE 0136
V 11	- -	TL071 VE 0141
V 12	2 × FET	2SK270 VB 1095
V 13	Op.Amp.	TL062 VE 0136
V 14,15	3 × 2-ch. Multi-/Demultip.	4053 VD 2087
V 16	Op.Amp.	TL062A VE 0217

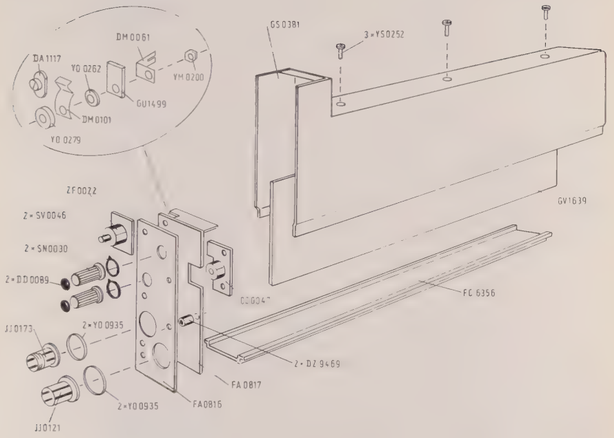
Screen	GS 0440
8-pin socket	JJ 0817
14-pin socket	JJ 1416
16-pin socket	JJ 1631
Isolation	XB 0375
Solder pin	YL 0083
Printed Circuit Board	XC 2128

BRÜEL & KJÆR
Nærum-Denmark

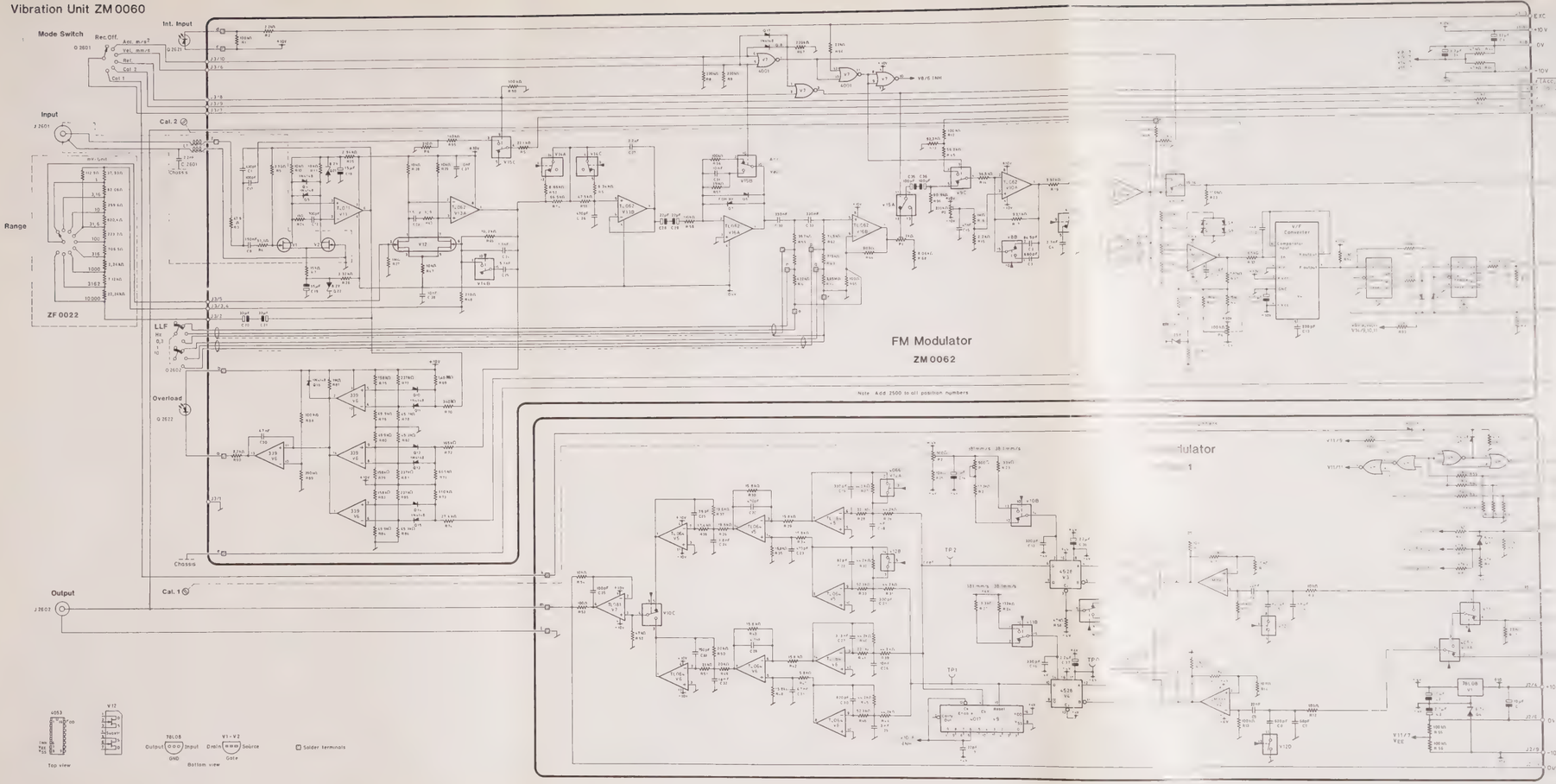
Vibration Unit ZM 0060

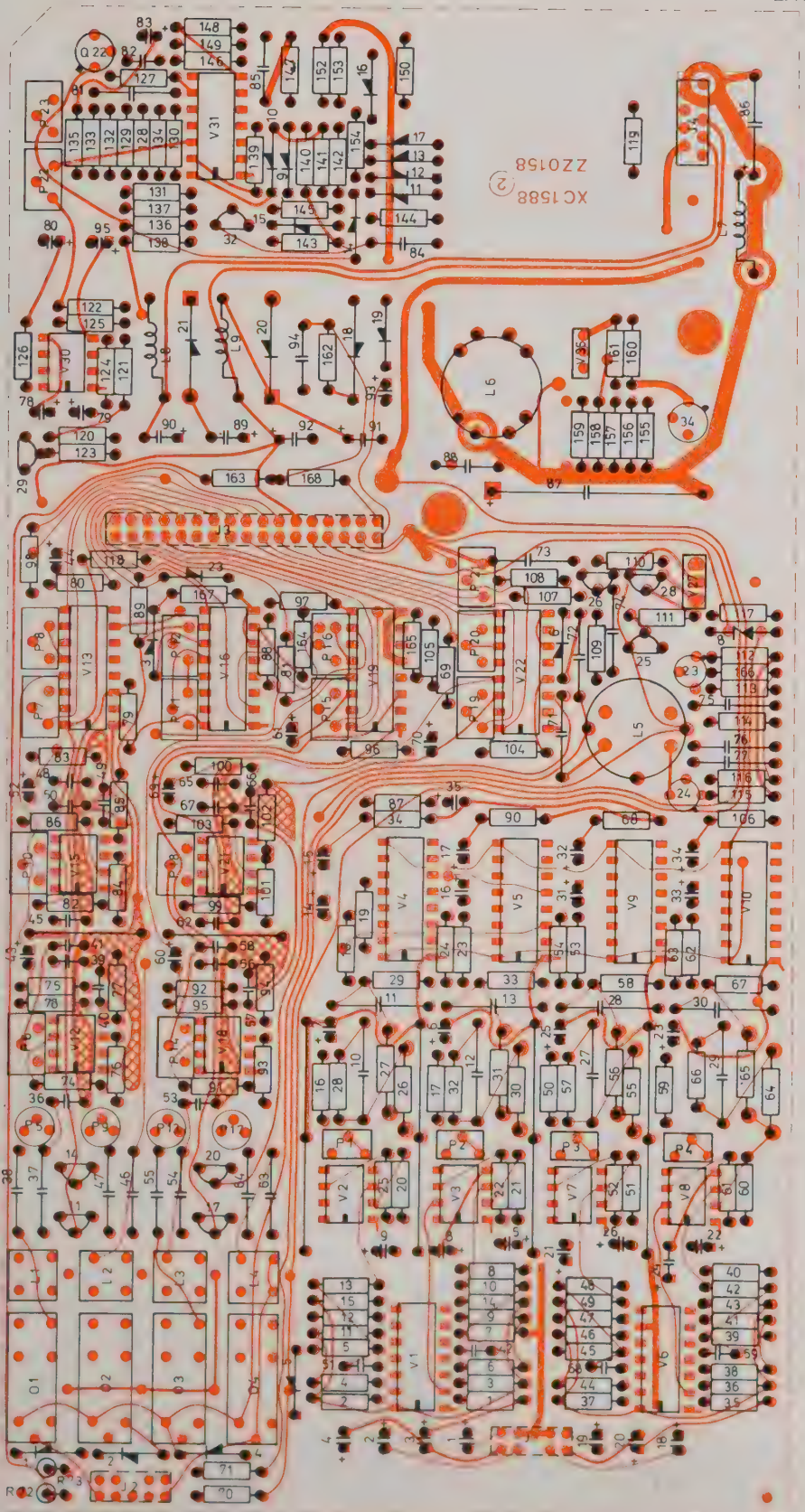
CIRCUIT DIAGRAM

C 2601	Ceramic	2.2 nF/100 V	CK 3222
Q 2621,22	LED		QV 4002
	Socket for LED		DZ 9471



Vibration Unit ZM 0060

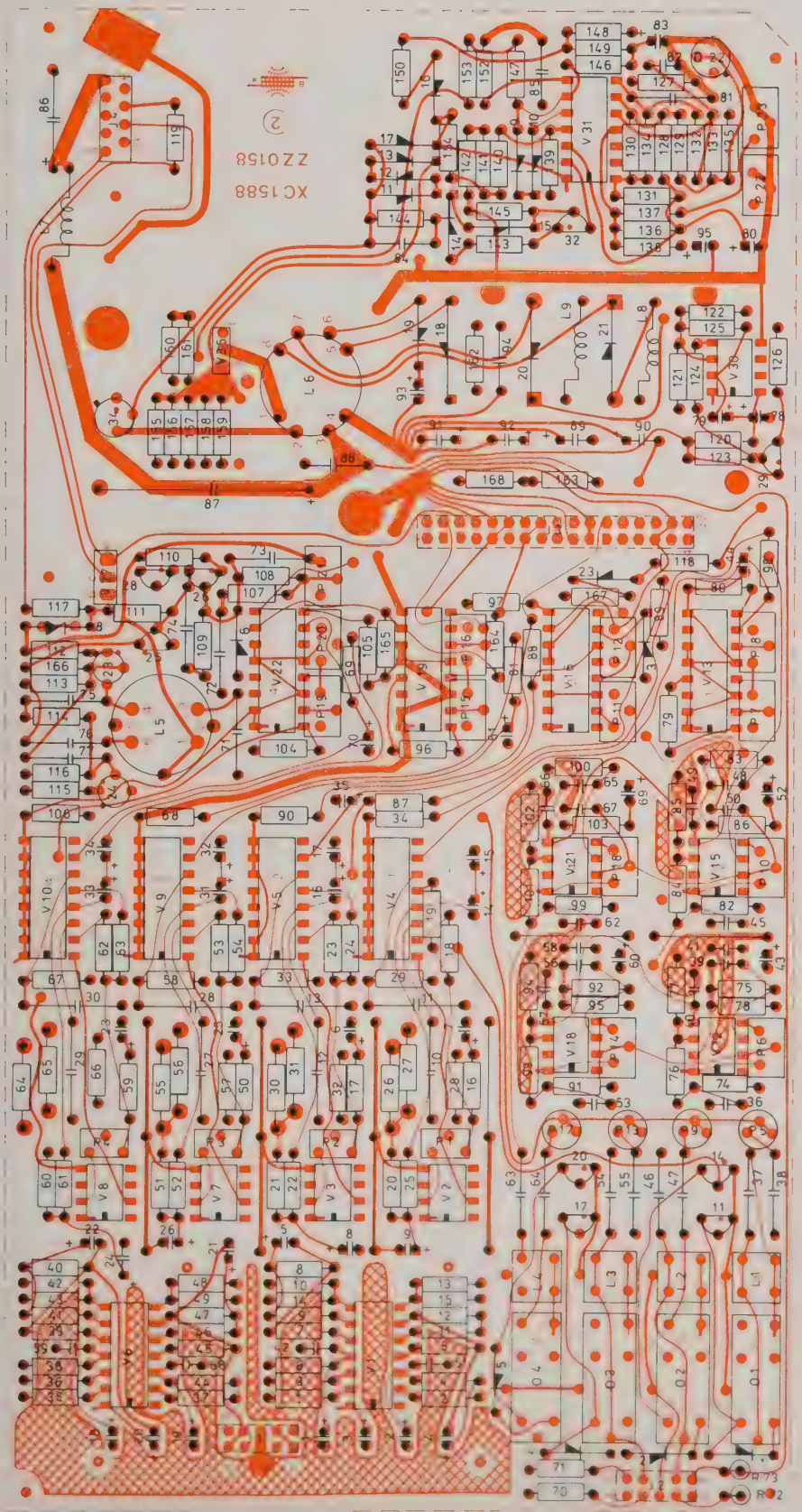




ZZ 0158-1
7007 from serial no. 1 110 404

Main Board ZZ 0158

LAYOUT DIAGRAM



ZZ 0158-3

7007 from serial no. 1 110 404

Note: Add 2100 to all position numbers.

C 1,2	Electrolytic		10 µF/ 40 V	CE 0473
C 3-9	-		33 µF/ 16 V	CE 0346
C 10-13	Polystyrene		5,6 nF/ 63 V	CT 1509
C 14-17	Electrolytic		33 µF/ 16 V	CE 0346
C 18,19	-		10 µF/ 40 V	CE 0473
C 20-23	-		33 µF/ 16 V	CE 0346
C 24	-		33 µF/ 10 V	CE 0353
C 25,26	-		33 µF/ 16 V	CE 0346
C 27-30	Polystyrene		5,6 nF/ 63 V	CT 1509
C 31-34	Electrolytic		33 µF/ 16 V	CE 0346
C 35	-		22 µF/ 25 V	CE 0352
C 36	Ceramic		220 pF/400 V	CK 2222
C 37	Polystyrene		820 pF/ 63 V	CT 1121
C 38	-		2,2 nF/ 63 V	CT 1126
C 39	Ceramic		2,7 pF/400 V	CK 0270
C 40,41	-		10 nF/ 30 V	CK 4101
C 42	-		120 pF/400 V	CK 2122
C 43	Electrolytic		15 µF/ 25 V	CE 0474
C 44	-		22 µF/ 25 V	CE 0352
C 45	Ceramic		220 pF/400 V	CK 2222
C 46	Polystyrene		820 pF/ 63 V	CT 1121
C 47	-		2,2 nF/ 63 V	CT 1126
C 48	Ceramic		2,7 pF/400 V	CK 0270
C 49,50	-	1%	10 nF/ 30 V	CK 4101
C 51	-	-	120 pF/400 V	CK 2122
C 52	Electrolytic		15 µF/ 25 V	CE 0474
C 53	Ceramic		200 pF/400 V	CK 2222
C 54	Polystyrene		820 pF/ 63 V	CT 1121
C 55	-		2,2 nF/ 63 V	CT 1126
C 56	Ceramic		2,7 pF/400 V	CK 0270
C 57,58	-	1%	10 nF/ 30 V	CK 4101
C 59	-	-	120 pF/400 V	CK 2122
C 60	Electrolytic		15 µF/ 25 V	CE 0474
C 61	-		22 µF/ 25 V	CE 0352
C 62	Ceramic		220 pF/400 V	CK 2222
C 63	Polystyrene		820 pF/ 63 V	CT 1121
C 64	-		2,2 nF/ 63 V	CT 1126
C 65	Ceramic	1%	2,7 pF/400 V	CK 0270
C 66,67	-	-	10 nF/ 30 V	CK 4101
C 68	-		120 pF/400 V	CK 2122
C 69	Electrolytic		15 µF/ 25 V	CE 0474
C 70	-		22 µF/ 25 V	CE 0352
C 71	Polystyrene	1%	6,8 nF/ 63 V	CT 1511
C 72	-	-	2,7 nF/ 63 V	CT 1158
C 73	-	-	2,4 nF/ 63 V	CT 1129
C 74	-	-	1 nF/ 63 V	CT 1132
C 75-77	-	-	820 pF/ 63 V	CT 1121
C 78	Electrolytic		15 µF/ 25 V	CE 0474
C 79	Tantalum		10 µF/ 35 V	CF 0064
C 80	Electrolytic		15 µF/ 25 V	CE 0474
C 81	Polystyrene	1%	1,6 nF/ 63 V	CT 1181
C 82	Ceramic		33 pF/400 V	CK 1330
C 83	Electrolytic		6,8 µF/ 25 V	CE 0472
C 84	Polyester		22 nF/400 V	CS 0432
C 85	-		10 nF/400 V	CS 0430
C 86	Electrolytic		10 µF/ 63 V	CE 0529
C 87	-		220 µF/ 40 V	CE 0454
C 88	Ceramic		47 nF/ 30 V	CK 4470
C 89-92	Tantalum		100 µF/ 16 V	CF 0078
C 93	Electrolytic		10 µF/ 40 V	CE 0473
C 94	Polyester		68 nF/250 V	CS 0435
C 95	Electrolytic		15 µF/ 25 V	CE 0474

J 4	9-pin connector	JP 0907

L 1-4	Coil	0,5 mH LB 0890
L 5	-	LB 0942
L 6	Transformer	LB 0943
L 7	Choke	LJ 0031
L 8,9	Filter coil	LB 0955

O 1-4	Relay	OC 0058

P 1-4	Cermet	1 kΩ PG 2114
P 5	-	500 Ω PG 1507
P 6	-	20 kΩ PG 3209
P 7	-	2 kΩ PG 2212
P 8	-	1 kΩ PG 2114
P 9	-	500 Ω PG 1507
P 10	-	20 kΩ PG 3209
P 11	-	2 kΩ PG 2212
P 12	-	1 kΩ PG 2114
P 13	-	500 Ω PG 1507
P 14	-	20 kΩ PG 3209
P 15	-	2 kΩ PG 2212
P 16	-	1 kΩ PG 2114
P 17	-	500 Ω PG 1507
P 18	-	20 kΩ PG 3209
P 19	-	2 kΩ PG 2212
P 20	-	1 kΩ PG 2114
P 21,22	-	20 kΩ PG 3209
P 23	-	1 kΩ PG 2114

Q 1-6	Si.	1N4148	75 V/75 mA	QV 0216
Q 8	Ze.	BZX70	6,7-7,0 V/0,4 W	QV 1374
Q 9-16	Si.	1N4148	75 V/75 mA	QV 0216
Q 17	Ge.	OA47	25 V/110 mA	QV 0094
Q 18	Si.	BY184	1500 V/400 mA	QV 0246
Q 19	-	BA158	600 V/400 mA	QV 0245
Q 20,21	-	MR911	100 V/100 mA	QV 0253
Q 22	Ze.	AD580JH	2,42-2,57 V/0,4 W	QV 0046
Q 23	Si.	1N4148	75 V/75 mA	QV 0216

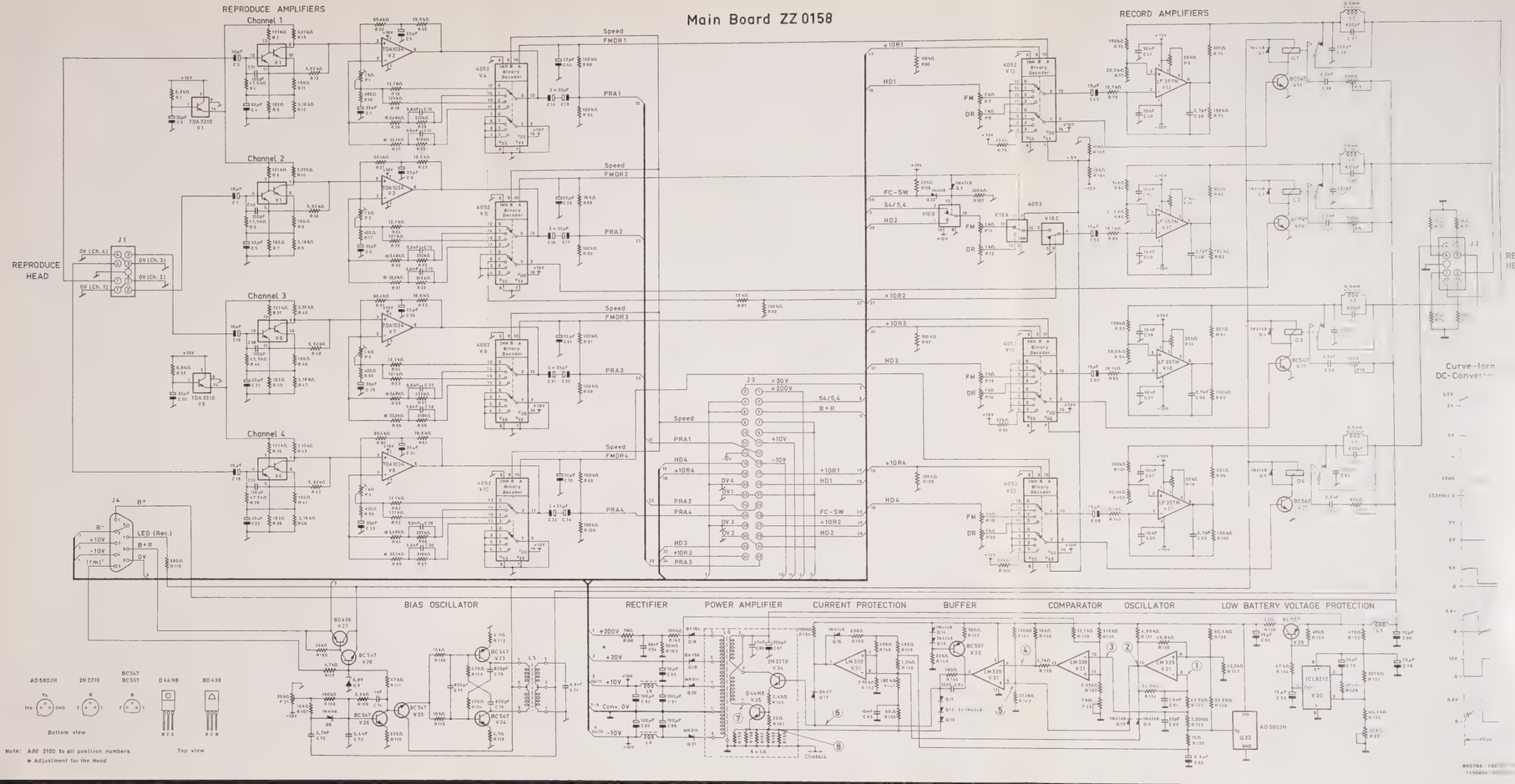
PARTS LIST

R 1	Carbon	1/4 W	5%	6,8 kΩ	RB 3680	R 63	Metal	1/4 W	1%	12,1 kΩ	RF 4121
R 2,3	Metal	-	1%	121 kΩ	RF 5121	R 64	-	-	-	3,48 kΩ	RF 3348
R 4	-	-	-	47,5 kΩ	RF 4475	R 65	-	-	-	33,2 kΩ	RF 4332
R 5	-	-	-	182 Ω	RF 2182	R 66	-	-	-	232 kΩ	RF 5232
R 6	-	-	-	47,5 kΩ	RF 4475	R 67	-	-	-	619 kΩ	RF 5619
R 7	-	-	-	182 Ω	RF 2182	R 68,69	Carbon	-	5%	100 kΩ	RB 5100
R 8	-	-	-	3,16 kΩ	RF 3316	R 70-73	Metal	-	1%	10,0 Ω	RF 1100
R 9	-	-	-	150 Ω	RF 2150	R 74	-	-	-	301 Ω	RF 2301
R 10	-	-	-	5,62 kΩ	RF 3562	R 75,76	-	-	-	150 kΩ	RF 5150
R 11	-	-	-	150 Ω	RF 2150	R 77	-	-	-	20,0 kΩ	RF 4200
R 12	-	-	-	3,16 kΩ	RF 3316	R 78	-	-	-	19,1 kΩ	RF 4191
R 13	-	-	-	5,62 kΩ	RF 3562	R 79	Carbon	-	5%	22 kΩ	RB 4220
R 14,15	-	-	-	3,32 kΩ	RF 3332	R 80,81	-	-	-	100 kΩ	RB 5100
R 16,17	-	-	-	402 Ω	RF 2402	R 82	Metal	-	1%	301 Ω	RF 2301
R 18	-	-	-	121 kΩ	RF 5121	R 83,84	-	-	-	150 kΩ	RF 5150
R 19	-	-	-	12,1 kΩ	RF 4121	R 85	-	-	-	20,0 kΩ	RF 4200
R 20,21	-	-	-	60,4 kΩ	RF 4604	R 86	-	-	-	19,1 kΩ	RF 4191
R 22	-	-	-	19,6 kΩ	RF 4196	R 87	Carbon	-	5%	22 kΩ	RB 4220
R 23	-	-	-	121 kΩ	RF 5121	R 88	-	-	-	18 kΩ	RB 4180
R 24	-	-	-	12,1 kΩ	RF 4121	R 89,90	-	-	-	100 kΩ	RB 5100
R 25	-	-	-	19,6 kΩ	RF 4196	R 91	Metal	-	1%	301 Ω	RF 2301
R 26	-	-	-	3,48 kΩ	RF 3348	R 92,93	-	-	-	150 kΩ	RF 5150
R 27	-	-	-	33,2 kΩ	RF 4332	R 94	-	-	-	20,0 kΩ	RF 4200
R 28	-	-	-	232 kΩ	RF 5232	R 95	-	-	-	19,1 kΩ	RF 4191
R 29	-	-	-	619 kΩ	RF 5619	R 96	Carbon	-	5%	22 kΩ	RB 4220
R 30	-	-	-	3,48 kΩ	RF 3348	R 97,98	-	-	-	100 kΩ	RB 5100
R 31	-	-	-	33,2 kΩ	RF 4332	R 99	Metal	-	1%	301 Ω	RF 2301
R 32	-	-	-	232 kΩ	RF 5232	R 100,101	-	-	-	150 kΩ	RF 5150
R 33	-	-	-	619 kΩ	RF 5619	R 102	-	-	-	20,0 kΩ	RF 4200
R 34	Carbon	-	5%	100 kΩ	RB 5100	R 103	-	-	-	19,1 kΩ	RF 4191
R 35	-	-	-	6,8 kΩ	RB 3680	R 104	Carbon	-	5%	22 kΩ	RB 4220
R 36,37	Metal	-	1%	121 kΩ	RF 5121	R 105,106	-	-	-	100 kΩ	RB 5100
R 38	-	-	-	47,5 kΩ	RF 4475	R 107	-	-	-	10 kΩ	RB 4100
R 39	-	-	-	182 Ω	RF 2182	R 108	-	-	-	150 kΩ	RB 5150
R 40	-	-	-	3,16 kΩ	RF 3316	R 109	-	-	-	3,3 kΩ	RB 3330
R 41	-	-	-	150 Ω	RF 2150	R 110	-	-	-	220 Ω	RB 2220
R 42	-	-	-	5,62 kΩ	RF 3562	R 111	-	-	-	47 kΩ	RB 4470
R 43	-	-	-	3,32 kΩ	RF 3332	R 112	-	-	-	4,7 Ω	RB 0470
R 44	-	-	-	47,5 kΩ	RF 4475	R 113,114	-	-	-	470 Ω	RB 2470
R 45	-	-	-	182 Ω	RF 2182	R 115	-	-	-	4,7 Ω	RB 0470
R 46	-	-	-	150 Ω	RF 2150	R 116	-	-	-	10 kΩ	RB 4100
R 47	-	-	-	3,16 kΩ	RF 3316	R 117	-	-	-	4,7 kΩ	RB 3470
R 48	-	-	-	5,62 kΩ	RF 3562	R 118	-	-	-	22 kΩ	RB 4220
R 49	-	-	-	3,32 kΩ	RF 3332	R 119	-	-	-	680 Ω	RB 2680
R 50	-	-	-	402 Ω	RF 2402	R 120	-	-	-	470 Ω	RB 2470
R 51	-	-	-	60,4 kΩ	RF 4604	R 121	Metal	-	1%	301 kΩ	RF 5301
R 52	-	-	-	19,6 kΩ	RF 4196	R 122	-	-	-	40,2 kΩ	RF 4402
R 53	-	-	-	121 kΩ	RF 5121	R 123,124	Carbon	-	5%	47 kΩ	RB 4470
R 54	-	-	-	12,1 kΩ	RF 4121	R 125	Metal	-	1%	464 kΩ	RF 5464
R 55	-	-	-	3,48 kΩ	RF 3348	R 126	Carbon	-	5%	22 Ω	RB 1220
R 56	-	-	-	33,2 kΩ	RF 4332	R 127	Metal	-	1%	42,2 kΩ	RF 4422
R 57	-	-	-	232 kΩ	RF 5232	R 128	-	-	-	60,4 kΩ	RF 4604
R 58	-	-	-	619 kΩ	RF 5619	R 129	-	-	-	33,2 kΩ	RF 4332
R 59	-	-	-	402 Ω	RF 2402	R 130	-	-	-	49,9 kΩ	RF 4499
R 60	-	-	-	60,4 kΩ	RF 4604	R 131	-	-	-	4,99 kΩ	RF 3499
R 61	-	-	-	19,6 kΩ	RF 4196	R 132	-	-	-	47,5 kΩ	RF 4475
R 62	-	-	-	121 kΩ	RF 5121	R 133	-	-	-	2,00 kΩ	RF 3200

PARTS LIST/CIRCUIT DIAGRAM

R 134	Metal	1/4 W	1%	24,9 kΩ	RF 4249	V 1	Trans. Array	TDA3310	VE 0241
R 135	Carbon	-	5%	10 Ω	RB 1100	V 2,3	Op.Amp.	TDA1034	VE 0127
R 136	Metal	-	1%	316 kΩ	RF 5316	V 4,5	Dif.4 Ch. Mult./Demultiplex.	4052B	VD 2086
R 137	-	-	-	6,65 kΩ	RF 3665	V 6	Trans.Array	TDA3310	VE 0241
R 138	-	-	-	22,1 kΩ	RF 4221	V 7,8	Op.Amp.	TDA1034	VE 0127
R 139	Carbon	-	5%	4,7 kΩ	RB 3470	V 9,10	Dif.4 Ch. Mult./Demultiplex.	4052B	VD 2086
R 140	-	-	-	10 kΩ	RB 4100	V 11	Silicon	BC547b	VB 0603
R 141	-	-	-	100 kΩ	RB 5100	V 12	Op.Amp.	LF357N	VE 0167
R 142	-	-	-	220 kΩ	RB 5220	V 13	Dif.4 Ch. Mult./Demultiplex.	4052B	VD 2086
R 143	-	-	-	100 Ω	RB 2100	V 14	Silicon	BC547b	VB 0603
R 144	-	-	-	180 Ω	RB 2180	V 15	Op.Amp.	LF357N	VE 0167
R 145	-	-	-	22 kΩ	RB 4220	V 16	3 × 2 Ch. Mult./Demultiplex.	4053B	VD 2087
R 146	Metal	-	1%	1,00 kΩ	RF 3100	V 17	Silicon	BC547b	VB 0603
R 147	-	-	-	1,62 kΩ	RF 3162	V 18	Op.Amp.	LF357N	VE 0167
R 148,149	-	-	-	499 Ω	RF 2499	V 19	Dif.4 Ch. Mult./Demultiplex.	4052B	VD 2086
R 150	-	-	-	698 Ω	RF 2698	V 20	Silicon	BC547b	VB 0603
R 152	-	-	-	2,55 kΩ	RF 3255	V 21	Op.Amp.	LF357N	VE 0167
R 153	Carbon	-	5%	68 Ω	RB 1680	V 22	Dif.4 Ch. Mult./Demultiplex.	4052B	VD 2086
R 154	-	-	-	100 kΩ	RB 5100	V 23-26	Silicon	BC547b	VB 0603
R 155-159	Metal	-	2%	1,00 Ω	RF 9210	V 27	-	BD436	VB 0120
R 160	-	-	1%	2,43 Ω	RF 9224	V 28	-	BC547b	VB 0603
R 161	Carbon	-	5%	22 Ω	RB 1220	V 29	-	BC557b	VB 0135
R 162	-	-	-	330 kΩ	RB 5330	V 30	Voltage Detector/Indicator	ICL8212	VE 0166
R 163	-	-	-	20 MΩ	RH 0903	V 31	Comparator	LM339N	VE 0110
R 164-166	-	-	-	10 kΩ	RB 4100	V 32	Silicon	BC557b	VB 0135
R 167	-	-	-	330 kΩ	RB 5330	V 34	-	2N2219	VB 0588
R 168	Metal	-	1%	1,00 MΩ	RF 6100	V 35	-	D44H8	VB 0585
R 169	Carbon	0,1 W	5%	33 kΩ	RA 0059				

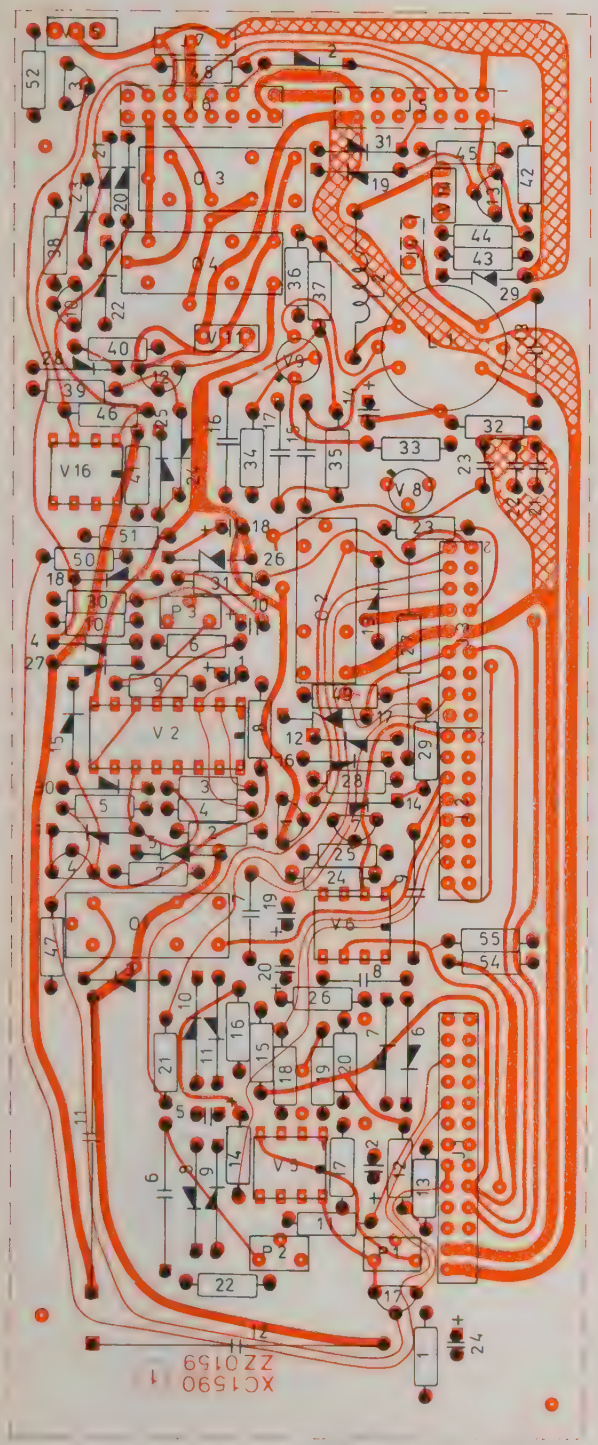
14-pin socket	JJ 1416
Printed Circuit Board	XC 1588



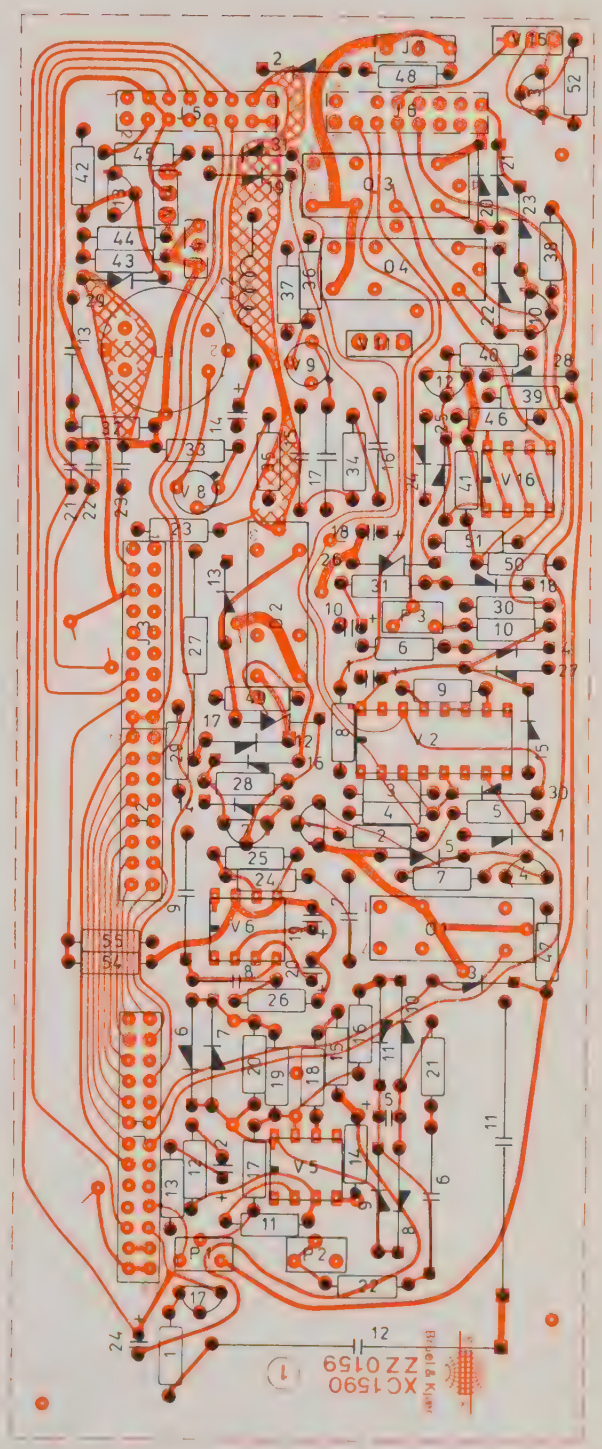
Interface Board

ZZ 0159

LAYOUT DIAGRAM



Viewed from the component side



Viewed from the solder side

ZZ 0159

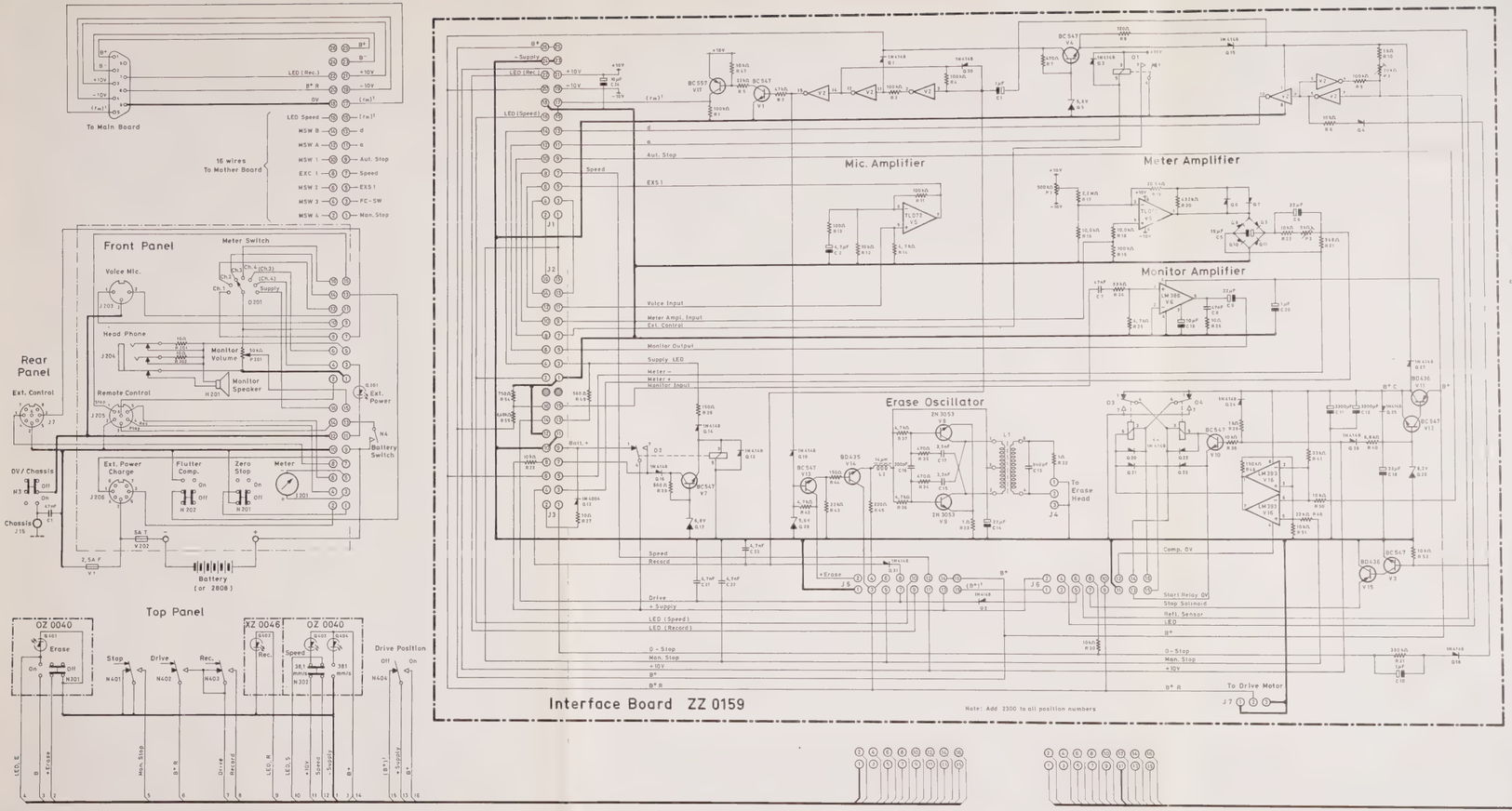
PARTS LIST

Note: Add 2300 to all position numbers.

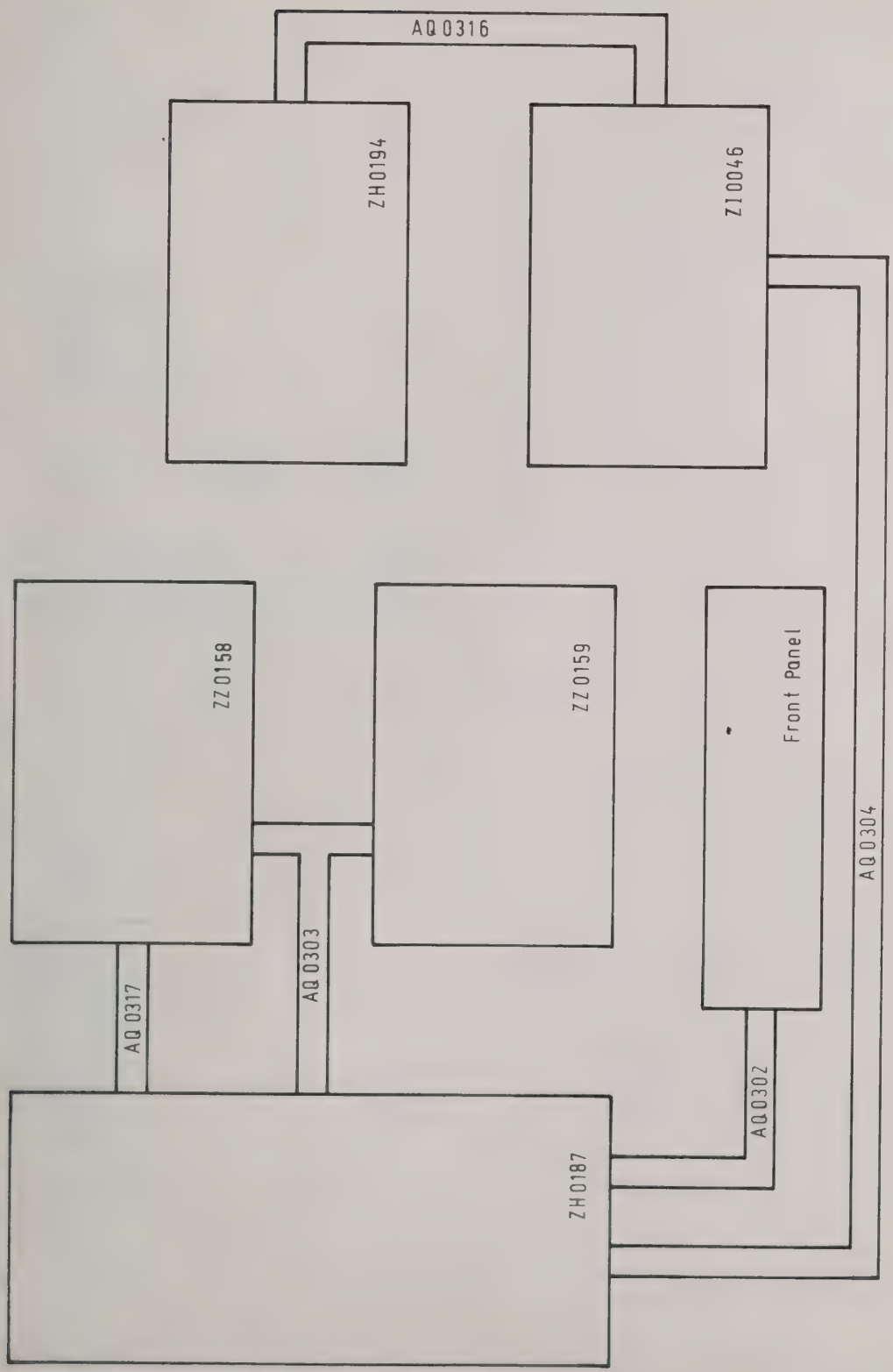
C 1	Electrolytic		1 µF/ 63 V	CE 0540
C 2	-		4,7 µF/ 40 V	CE 0475
C 5	-		15 µF/ 25 V	CE 0474
C 6	Tantalum		22 µF/ 15 V	CF 0042
C 7,8	Ceramic		47 nF/ 30 V	CK 4470
C 9	Electrolytic		22 µF/ 10 V	CE 0203
C 10	-		1 µF/ 63 V	CE 0540
C 11,12	-		3300 µF/ 10 V	CE 0360
C 13	Polystyrene	1%	940 pF/500 V	CT 1300
C 14	Electrolytic		22 µF/ 10 V	CE 0352
C 15	Polystyrene	1%	3,3 nF/ 30 V	CT 1544
C 16	-	-	200 pF/125 V	CT 1118
C 17	-	-	3,3 nF/ 30 V	CT 1544
C 18	Electrolytic		33 µF/ 16 V	CE 0346
C 19	-		10 µF/ 40 V	CE 0473
C 20	-		1 µF/ 63 V	CE 0540
C 21-23	Ceramic		4,7 nF/ 30 V	CK 3473
C 24	Electrolytic		10 µF/ 40 V	CE 0473
J 1	26-pin plug			JP 2605
J 2,3	34-pin plug			JP 3404
L 1	Transformer			LB 0824
L 2	Coil		14 µH	LJ 0009
O 1	Relay			OC 0059
O 2-4	-			OC 0058
P 1	Cermet		500 kΩ	PG 4511
P 2	-		5 kΩ	PG 2524
P 3	-		20 kΩ	PG 3209
Q 1-4	Si.	1N4148	75 V/75 mA	QV 0216
Q 5	Ze.	BZX79	5,3-5,9 V/0,25 W	QV 1105
Q 6,7	Si.	ZS150/151	50 V/250 mA	QV 0226
Q 8-11	Ge.	OA47	25 V/110 mA	QV 0094
Q 12	Si.	4004	400 V/1 A	QV 0237
Q 13-16	-	1N4148	75 V/75 mA	QV 0216
Q 17	Ze.	BZX79	6,0-7,5 V/0,25 W	QV 1106
Q 18-25	Si.	1N4148	75 V/75 mA	QV 0216
Q 26	Ze.	BZX79	7,8-8,6 V/0,25 W	QV 1344
Q 27,28	Si.	1N4148	75 V/75 mA	QV 0216
Q 29	Ze.	BZX79	5,3-5,9 V/0,25 W	QV 1107
Q 30,31	Si.	1N4148	75 V/75 mA	QV 0216
R 1	Carbon	1/4 W	5%	100 kΩ	RB 5100
R 2	-	-	-	47 kΩ	RB 4470
R 3,4	-	-	-	100 kΩ	RB 5100
R 5	-	-	-	22 kΩ	RB 4220
R 6	-	-	-	10 kΩ	RB 4100
R 7	-	-	-	470 Ω	RB 2470
R 8	-	-	-	120 Ω	RB 2120
R 9	-	-	-	100 kΩ	RB 5100
R 10	-	-	-	1,0 kΩ	RB 3100
R 11	-	-	-	100 kΩ	RB 5100
R 12	-	-	-	10 kΩ	RB 4100
R 13	Carbon	1/4 W	5%	100 Ω	RB 2100
R 14	-	-	-	4,7 kΩ	RB 3470
R 15	-	-	-	100 kΩ	RB 5100
R 16	Metal	-	1%	10,0 kΩ	RF 4100
R 17	Carbon	-	10%	2,2 MΩ	RB 6220
R 18	Metal	-	1%	10,0 kΩ	RF 4100
R 19	-	-	-	20,5 kΩ	RF 4205
R 20	-	-	-	432 kΩ	RF 5432
R 21	-	-	-	348 Ω	RF 2348
R 22,23	Carbon	-	5%	10 kΩ	RB 4100
R 24	-	-	-	33 kΩ	RB 4330
R 25	-	-	-	4,7 kΩ	RB 3470
R 26	-	-	-	10 Ω	RB 1100
R 27	Wire	4 W	10%	10 Ω	RX 0324
R 28	Carbon	1/4 W	5%	560 Ω	RB 2560
R 29	-	-	-	150 Ω	RB 2150
R 30	-	-	-	10 kΩ	RB 4100
R 31	-	-	-	330 kΩ	RB 5330
R 32,33	Metal	-	1%	1,00 Ω	RF 9210
R 34,35	Carbon	-	5%	470 Ω	RB 2470
R 36,37	-	-	-	4,7 kΩ	RB 3470
R 38	-	-	-	10 kΩ	RB 4100
R 39	-	-	-	1,0 kΩ	RB 3100
R 40	-	-	-	6,8 kΩ	RB 3680
R 41	-	-	-	33 kΩ	RB 4330
R 42	-	-	-	4,7 kΩ	RB 3470
R 43	-	-	-	22 kΩ	RB 4220
R 44	-	-	-	150 Ω	RB 2150
R 45	-	-	-	220 Ω	RB 2220
R 46	-	-	-	150 kΩ	RB 5150
R 47	-	-	-	10 kΩ	RB 4100
R 48	-	-	-	22 kΩ	RB 4220
R 49	-	-	-	560 Ω	RB 2560
R 50-52	-	-	-	10 kΩ	RB 4100
R 54	Metal	-	1%	750 Ω	RF 2750
R 55	-	-	-	6,49 kΩ	RF 3649

V 1	Silicon	BC547b	VB 0603
V 2	6 × Buffer/Conv.(inv)	4049BE	VD 2024
V 3,4	Silicon	BC547b	VB 0603
V 5	Op.Amp.	TL072	VE 0146
V 6	- -	LM386	VE 0162
V 7	Silicon	BC547b	VB 0603
V 8,9	-	2N3053	VB 0251
V 10	-	BC547b	VB 0603
V 11	-	BD436	VB 0120
V 12,13	-	BC547b	VB 0603
V 14	-	BD435	VB 0557
V 15	-	BD436	VB 0120
V 16	2 × Comparator	LM393	VE 0163
V 17	Silicon	BC557	VB 0135

8-pin socket	JJ 0817
16-pin socket	JJ 1631
Printed Circuit Board	XC 1590



803765 - 7008.21 - ZZ 0159 - 7005 G
1110404 - 830912 - ZZ 0159 - 7007


AQ 0316
ZH 0194
ZI 0046
ZZ 0158
ZZ 0159
Front Panel
AQ 0304
AQ 0303
AQ 0317
AQ 0302
ZH 0187

Circuit Diagram, see ZZ 0159

Front Panel UA 0626

Note: Add 200 to all position numbers.

H 1	"Monitor Speaker"			HP 0024
I 1	"Meter"	100 μA		IM 0078
J 2	Socket for fuse			JS 0007
J 3	"Voice Mic.			JJ 0313
J 4	"Head Phone"			JJ 0323
J 5	"Remote Control"			JJ 0605
J 6	"Ext.Power Charge"			JJ 0719
N 1	ZERO STOP			NN 0031
N 2	FLUTTER COMP.			NN 0031
O 1	METER SWITCH			OI 0036
P 1	"Monitor Volume"	log	50 kΩ	PD 3511
Q 1	LED			QV 4002
R 1,2	Carbon	1/4 W 5%	10 Ω	RB 1100
V 2	Fuse, slow	5 A		VF 0015
	P.C.Board for LED			XZ 0046

Mother Board ZH 0187

Note: Add 1300 to all position numbers.

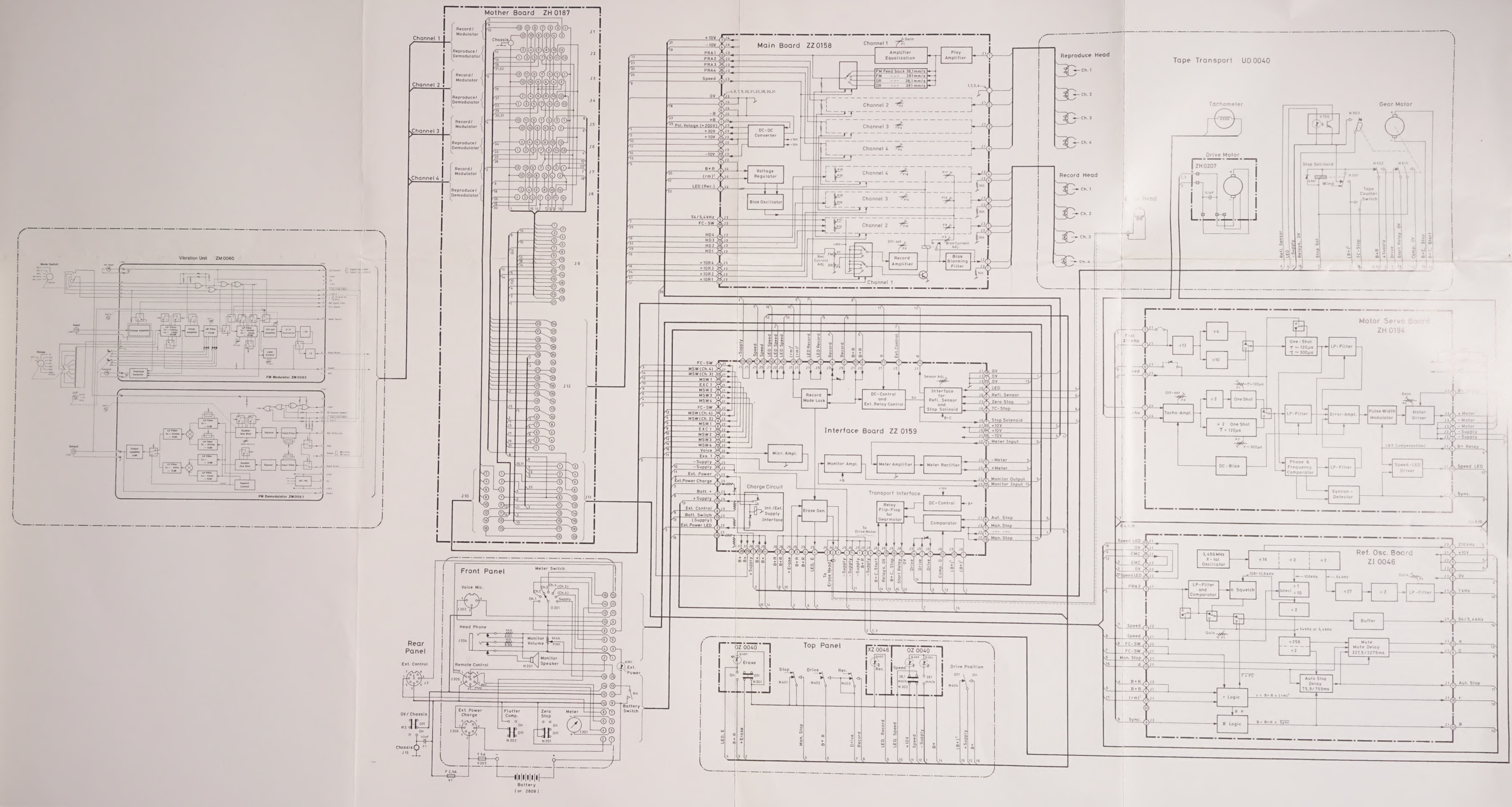
J 1-8	13-pin socket	JJ 1301
J 9	21-pin socket	JJ 2102
J 10	16-pin plug	JP 1603
J 11	20-pin plug	JP 2011
J 12	34-pin plug	JP 3402
	Printed Circuit Board	XC 1580

Miscellaneous

C 1	Polyester	47 nF/250 V	CS 0109
C 1501	-	0,1 μF/100 V	CS 0436
J 1	Socket for fuse		JS 0038
J 2	"Ext. Control"		JJ 0802
J 15	"Chassis"		JT 6204
N 3	0 V/CHASSIS		NN 0082
N 4	SWITCH		NT 0032
N 301	ERASE		NN 0110
N 302	SPEED		NN 0110
N 401	STOP		NT 0201
N 402	DRIVE		NT 0201
N 403	REC.		NT 0201
N 404	DRIVE POSITION		NT 0011
N 501	"Stop Solenoid"		NT 0204
N 502	Microswitch		NT 0204
N 503	-		NT 0202
N 515	-		NT 0119
Q 401-404	LED		QV 4002
Q 501	Si. 1N4148	75 V/75 mA	QV 0216
V 1	Fuse,fast	2,5 A	VF 0029
V 701	Infared Sensor GaAs: Si	OB710	VD 0094

Furthermore 7007 includes the following Subassemblies the details of which will be found under the respective numbers.

Servo Board	ZH 0194
Reference Oscillator Board	ZI 0046
Vibration Unit	ZM 0060
Main Board	ZZ 0158
Interface Board	ZZ 0159


Mother Board ZH 0187
Channel 1
Channel 2
Channel 3
Channel 4
Record / Modulator
Reproduce / Demodulator
Chassis
J1
J2
J3
J4
J5
J6
J7
J8
J9
J10
J11
J12
Vibration Unit ZM 0060
Mode Switch
Input
Range
Output
Charge Amplifier
LP Filter
Integr. Amplifier
HP Filter
RMS Converter
Meter Switch
Direct Out
Speed
Short Circuit Detector
FM Modulator ZM 0062
FM Demodulator ZM 0061
Main Board ZZ 0158
Channel 1
Amplifier Equalization
Play Amplifier
FM Feed back 38,1 mm/s
Channel 2
Channel 3
Channel 4
DC-DC Converter
Voltage Regulator
Bias Oscillator
Record Amplifier
Bias Biasing Filter
Bias Current Adj.
Rec. Current Adj.
Off-set
Reproduce Head
Record Head
Erase Head
Ch. 1
Ch. 2
Ch. 3
Ch. 4
Tape Transport UD 0040
Tachometer
Drive Motor
ZH 0207
Gear Motor
Stop Solinoid
Wind
Tape Counter Switch
Interface Board ZZ 0159
Record Mode Lock
DC-Control and Ext. Relay Control
Interface for Refl. Sensor and Stop Solinoid
Micr. Ampl.
Monitor Ampl.
Meter Amplifier
Meter Rectifier
Charge Circuit
Int./Ext. Supply Interface
Erase Gen.
Transport Interface
Relay Flip-Flop for Gearmotor
DC-Control
Comparator
Motor Servo Board ZH 0194
Tacho-Ampl.
One Shot
LP-Filter
Error-Ampl.
Pulse Width Modulator
Motor Driver
Phase & Frequency Comparator
Speed-LED Driver
Synron-Detector
DC-Bias
Ref. Osc. Board ZI 0046
3,456 MHz X-tal Oscillator
LP-Filter and Comparator
Squelch
Buffer
Mute
Auto Stop Delay 75,9/759 ms
r Logic
B Logic
Front Panel
Meter Switch
Voice Mic.
Head Phone
Monitor Volume
Monitor Speaker
Rear Panel
Ext. Control
Remote Control
Ext. Power
Ext. Power Charge
Flutter Comp.
Zero Stop
Meter
Battery Switch
Battery (or 2808)
Top Panel
OZ 0040
Erase
Stop
Drive
Rec.
XZ 0046
Drive Position